IOWA STATE COLLEGE

1900-1901

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IOWA STATE COLLEGE

.....OF.....

AGRICULTURE

.....AND.....

THE MECHANIC ARTS.

CATALOG 1900-1901.

"SCIENCE WITH PRACTICE"

1901.
BY THE COLLEGE.
AMES.

1901	Sunday	Monday	Tuesday	Wednesd'y	Thursday	Friday	Saturday
Jan.	...	...	1	2	3	4	5
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1901	Sunday	Monday	Tuesday	Wednesd'y	Thursday	Friday	Saturday
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CALLENDAR FOR 1901-1902

Second Term Begins.....Tuesday, February 12th
Entrance Examinations.....Tuesday, February 12th.
Entrance Examinations.....Wednesday, February 13th.
Recitations Begin.....Thursday, February 14th.
Memorial Day.....Thursday, May 30th.
Baccalaureate Address.....Sunday, June 9th.
Commencement.....Wednesday, June 12th.
College Year Begins.....Tuesday, August 27th.
Entrance Examinations.....Tuesday, August 27th.
Entrance Examinations.....Wednesday, August 28th.
Recitations Begin.....Thursday, August 29th.
Thanksgiving Day.....Thursday, November 28th.
Winter Vacation from December 19, 1901, to February 11, 1902.
Second Term Begins.....Tuesday, February 11th.
Entrance Examinations.....Tuesday February 11th,
Entrance Examinations.....Wednesday, February 12th.
Recitations Begin.....Thursday, February 13th.
Memorial Day.....Friday, May 30th.
Baccalaureate Address.....Sunday, June 8th.
Commencement.....Wednesday, June 11th.

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OFFICERS OF THE COLLEGE.

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Instructor in English.

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Instructor in Chemistry.

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Instructor in English.

MISS ELIZABETH MACLEAN, M. Di.,
Instructor in English.

* Granted leave of absence during the Spring Term, 1901.

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MISS ALLICE HESS, B. Sc.,
Instructor in Domestic Economy.

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Instructor in German.

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Director of Physical Culture and Instructor in Latin.

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Instructor in Mining Engineering.

ED. H. WEBSTER, B. S. AG.,
Instructor in Dairying.

C. E. ELLIS, B. S. A.,
Instructor in Agricultural Chemistry.

MISS A. ESTELLA PADDOCK, B. Sc.,
Instructor in Botany.

L. R. WALKER, B. Sc.,
Instructor in Zoology.

F. W. FAUROT, B. Sc.,
Instructor in Botany.

W. L. JOHNSON, D. V. M.,
Resident Surgeon of Veterinary Hospital and Demonstrator of Anatomy.

*MISS HELEN G. REED, PH. B.,
Instructor in English.

* During the Spring Term, 1901.

EDWARD E. LITTLE, B. S. AG.,
Assistant in Horticulture.

HENRY PALMER, B. S. AG.,
Assistant in Dairying.

GEORGE JUDISCH,
Director of Veterinary Dispensary and Lecturer on Pharmacy.

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MISS OLIVE E. STEVENS, B. L.,
Assistant Librarian.

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Oral Bacteriology.

C. G. LEE, B. S., LL. D., AMES, IOWA.,
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Dairying.

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Assistant in Agriculture.

JOSEPH J. EDGERTON, B. Ag.,
Assistant in Agricultural Physics.

C. H. ECKLES, B. Agr., M. Sc.,
Assistant in Dairying and Dairy Bacteriology.

* Granted an indefinite leave of absence as Secretary of Agriculture.

C. E. ELLIS, B. S. A.,
Assistant Chemist.

E. E. LITTLE, B. S. A.,
Assistant Horticulturist.

F. R. MARSHALL, B. S. A.,
Assistant in Animal Husbandry.

E. H. WEBSTER, B. S. A.,
Assistant in Dairying.

F. W. FAUROT, B. Sc.,
Assistant in Botany.

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Assistant in Botany.

WILLIAM T. SHAW, B. Ag., B. S.,
Assistant Entomolgist.

CHARLOTTE M. KING,
Artist.

HISTORICAL

LOCATION

BUILDINGS, GROUNDS AND EQUIPMENTS

HISTORICAL.

In 1858 the Legislature of Iowa passed an act to establish "A State Agricultural College and Model Farm," to be connected with the entire agricultural interests of the State; appointed a board of commissioners to buy a farm and erect a college building, and elected a board of trustees to select a faculty and organize a college. In 1859 a farm of six hundred and forty acres, situated near Ames, was purchased for the use of the college. The farm now contains eight hundred and forty acres.

In 1862 a bill was passed by Congress, entitled, "An act donating public lands to the several States and Territories, which may provide colleges for the benefit of Agriculture and the Mechanic Arts."

Section 1 of this act provides that for the support of such colleges there be granted "an amount of public land, to be apportioned to each State in quantity to equal thirty thousand acres for each Senator and Representative in Congress to which the States are respectively entitled by the apportionment under the census of 1860; provided that no mineral lands shall be selected or purchased under the provisions of this act."

Section 4 requires: "That all moneys derived from the sale of the lands aforesaid by the States to which lands are apportioned, and from the sale of land script, hereinbefore provided for, shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except as may be provided for in section fifth of this act), and the interest of which shall inviolably be apportioned by each State which may take and claim the benefit of this act, to the endowment, support and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are

related to agriculture and the mechanic arts, in such manner as the Legislature of the State may provide, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Section 5 says: "And be it further enacted, that the grant of land and land script hereby authorized, shall be made on the following conditions, to which, as well as the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative acts; first, if any portion of the fund, invested as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or contingency, be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interests shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum not exceeding ten per centum upon the amount received by any State under the provisions of this act, may be expended for the purchase of land for sites or experimental farms, wherever authorized by the respective Legislatures of said States. Second, no portion of said fund nor the interest thereon shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation or repair of any building or buildings."

The General Assembly of Iowa, September 11, 1862, accepted the grant upon the conditions and under the restrictions contained in the act of Congress, and by so doing entered into contract with the General Government to erect and keep in repair all buildings necessary for the use of the College. By this action of the General Assembly the College was changed from an agricultural institution into a College of Agriculture and Mechanic Arts, with the broad and liberal course of study outlined in the following paragraph.

In 1882 the General Assembly passed an act defining the course of study to be pursued as follows: Section 1. That section 1621 of the Code is hereby repealed and the

following is enacted in lieu thereof. Section 1621. There shall be adopted and taught in the State Agricultural College a broad, liberal and practical course of study, in which the leading branches of learning shall relate to agriculture and the mechanic arts, and which shall also embrace such other branches of learning as will most practically and liberally educate the agricultural and industrial classes in the several pursuits and professions of life, including military tactics. Section 2. That all acts, and parts of acts inconsistent with this act are hereby repealed.

August 30th the following act was approved by President Harrison: "Be it enacted by the Senate and House of Representatives of the United States in Congress assembled, that there shall be and hereby is, annually appropriated, out of any moneys in the treasury not otherwise appropriated, arising from the sales of public lands, to be paid as hereinafter provided, to each State and Territory for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established, or which may hereafter be established, in accordance with an act of Congress approved July second, eighteen hundred and sixty-two, the sum of fifteen thousand dollars over the preceding year, and the annual amount to be paid thereafter to each State and Territory shall be twenty-five thousand dollars, to be applied only to instruction in agriculture, the mechanic arts, the English language and the various branches of mathematical, physcial, natural and economic science, with special reference to their applications in the industries of life, and to facilities for such instruction."

The income of the College from National grants is therefore expended in instruction, experimentation and illustration in agriculture and in the mechanic arts, and in underlying and related science and literature.

All buildings are erected and all repairs thereon are made by the State of Iowa, the cost down to date being about $500,000.

The College was formally opened on the 17th of March, 1869.

AMES AND THE COLLEGE.

The College occupies a delightful and healthful location upon high rolling land, just west of Ames, Story County. The railroad facilities for reaching Ames from every part of the State are excellent. It is at the junction of the Des Moines and the northwestern branches and the main line of the Chicago & Northwestern R. R. The main line of the Chicago, Milwaukee & St. Paul intersects the Northwestern at Slater, eleven miles south, and the through line of the same system at Algona on the north. The main line of the Illinois Central intersects the Chicago & Northwestern at Webster City, just north, and the main line of the Iowa Central makes good connections at Marshalltown on the east. All the railway connections of Des Moines have thirty-seven miles to Ames. The Chicago & Northwestern Railway has frequent trains Des Moines to Ames and return. A steam motor railway connects Ames and the College with an efficient service. Ames is a most desirable town for wholesome college influences. Its people are enterprising, thrifty and cordial. The town has an excellent system of public schools, numerous churches, water works, electric lights, and a good city government. It affords wholesome surroundings for the students. It is an inviting community for families who wish to educate their children, enjoy the better elements of society and an environment of reasonable expenses. The town and the College are on very cordial terms, and its citizens take marked pains in the efforts of the students and the highest interests of the College. It is a model location for factories and business enterprises.

BUILDINGS, GROUNDS AND EQUIPMENT.

BUILDINGS.

Fifteen commodious buildings have been erected by the State at a cost of about $500,000, for the exclusive use of the various departments of the College, besides the dwelling houses and buildings for farm stock, machinery and work.

The main College building is five stories high, including the basement, and is 158 feet long by 112 feet through the wings.

This building is used for dormitory and the department of botany, with recitation, society and reception rooms. About 250 students and teachers can be accommodated in this building.

All the rooms are heated by steam and lighted by electricity. Pure water is supplied in all the stories of the building.

There are also two rooming cottages, brick buildings, affording rooms for ninety-four students. The cottages are supplied with pure water, and lighted by electricity.

The other buildings are as follows, used for recitation and lecture rooms and laboratories:

Chemical and Physical Hall: Brick, three stories throughout; steam heat; water and gas. Laboratory outfit complete for 100 students in Chemistry; also nearly as many in Physics.

Veterinary Hospital: Brick, three stories, containing offices, dissecting rooms, and all modern appliances for the treatment of diseased animals.

Sanitary Hall: Frame, two stories; lower floor, office, kitchen and dining room for the hospital patients and rooms

for convalescents; upper floor, seven rooms for care of sick among the students.

Engineering Hall: Brick, four stories, including basement, and a large "L," containing machine shops, recitation rooms, drawing rooms, for the departments of Mechanical and Civil Engineering.

The Wood Shops: Brick, containing carpenter and pattern shops, with power and hand tools complete for wood work, and outfits of tools for individual work.

Forge Shop and Foundry: Brick, containing complete equipment for forging and moulding.

The Main Engineering Hall: There is in process of erection a new fire-proof building in which all of the engineering departments will have offices, recitation and lecture rooms, laboratories and engineering museum. This building will be of Bedford stone, will have plate glass windows, and modern conveniences and furnishings throughout. It will be the best engineering building at present west of the Mississippi river.

Power House: Brick, one story, contains engine and boiler, furnishing power for the shops, and accommodates experimental work of the course in Mechanical Engineering. The dynamos and motor power for electric engineering are now in this building, also the deep well pump.

Locomotive Shed: This building contains an eight-wheel locomotive and tender presented by the Chicago & Northwestern Railway Company.

Music Hall: Brick, two stories, fitted up with apparatus and instruments for practice and instruction.

The Administrative Building: Brick, for the use of trustees and faculty, and for offices of the president, secretary and treasurer.

Dwelling Houses: Fourteen comfortable dwelling houses on the grounds are occupied by professors' families, and several others by foremen and employes.

Morrill Hall is named in honor of Hon. Justin S. Morrill, the originator of the "Land Grant" for Colleges of Agriculture and Mechanic Arts. The building cost

about $35,000, including water supply, steam heat and electric light. It is of deep red brick, with stone foundation, and stone, brick and terra cotta trimmings interblended.

It stands on the high ground of the beautiful campus, north of and near the main building. It is for Chapel, capacity, 650; Library, containing 12,000 volumes; the Museum, Lecture Rooms and Laboratories of the Departments of Zoology and Geology.

Agricultural Hall is a four-story building. The lower stories are composed of stone from the State quarries at Anamosa, and the upper stories are brick. It contains rooms for Horticulture, Agriculture, Agricultural Chemistry, Experiment Station work and Veterinary Medicine. It is finely lighted and heated and contains modern improvements.

Green House: Containing propagating room, palm house and modern green house facilities.

Horse Barn and Stock Pavilion: A new barn composed of brick, slate roof, has just been completed for horses, the storage of grain and general farm purposes. One of the best stock pavilions in the country accommodating several hundred students at a time, circular in form, well heated and lighted, is located near this barn and gives first class advantages for stock judging and animal husbandry.

Other Buildings: Creamery, stables, barns, sheep and swine houses, seed houses, etc., sufficient for the requirements of the farm, are conveniently grouped near the College Campus.

MARGARET HALL.

A commodious and inviting building has been opened for the young women in the College. It is designed with choice architecture, composed of brick, roofed with slate and finished with taste. It occupies one of the most sightly locations on the campus, giving the most pleasing outlook to its occupants. It is provided with steam heat, electric lights, ample parlors, bath rooms and the most improved modern conveniences. It is neatly and tastefully furnished throughout. A large dining room is in connection with the building, with a capacity for eight hundred students. The Department of Domestic Economy also is located in the building and open to all young women of the College. Rooms will be assigned to new students in the order of their application. The young women are under the direction of an efficient dean of women.

THE COLLEGE GROUNDS.

The College domain includes about 840 acres. Of this about 125 acres are set apart for college grounds. These occupy the high land of the southwest part of the farm, and include the campus, shrubbery, plantations, young forestry plantations, the flower borders and gardens, with the beginnings of a botanical garden, and the surroundings of the professors' dwellings. Gravel drives, cement and gravel walks lead to all parts of the grounds and to the various buildings, and the true principles of landscape gardening have been so faithfully observed in the gardening and in the location of buildings and drives as to make of the entire campus a large and beautiful park. The view of the surrounding country from the upper stories and towers of the Main Building is one of wide extent and great beauty.

DIRECTIONS TO GRADUATES AND STUDENTS

REQUIREMENTS FOR ADMISSION.

CLASSIFICATION AND GRADING.

UNDERGRADUATE COURSES OF STUDY AND DEGREES.

POST-GRADUATE COURSES OF STUDY AND ADVANCED DEGREES.

ENTRANCE REQUIREMENTS

ADMISSION TO THE ACADEMIC YEAR.

YEAR BEGINS AUGUST 27, 1901.

Candidates for admission to the first term of the Academic Year will be required to pass a satisfactory examination in geography, arithmetic, United States history, human physiology, algebra to simple equations, orthography, reading, and grammar. The examination in grammar will cover the following subjects: the eight parts of speech, the classification of nouns, pronouns, adjectives, and adverbs, the declension of nouns and pronouns, the comparison of adjectives and adverbs, and the rules of spelling that apply in grammatical inflection. For further information see sample examination questions bearing the heading, Preparatory Grammar, page 34. Examinations will be held on the first and second days of the school year. In lieu of these examinations, first-class teachers' certificates or standings from accredited schools will be accepted.

ADMISSION TO SECOND TERM OF ACADEMIC YEAR.

TERM BEGINS FEBRUARY 11, 1902.

Students seeking admission to the second term of the Academic Year will need to meet the requirements for admission to the first term and in addition thereto, pass a satisfactory examination in the studies of that term. No student assigned to the algebra of the first term will be allowed to take plane geometry. Graduates of schools

included in either list of "Accredited Schools" will be accepted without examination.

The examination in algebra will include addition, subtraction, multiplication, division, factoring, highest common factor, lowest common multiple, fractions, simple equations containing one or more unknown quantities, problems involving equations of the first degree, and the discussion of such equations. The work in algebra should be of a grade equal to that in Wentworth's New School or Wells' Essentials of Algebra.

The examination in English will cover the entire field of grammar, except prosody. In this examination much will depend on the candidate's ability to analyze a passage of good modern prose, and to punctuate his paper correctly. In analyzing he should be prepared to treat phrases and clauses as units, and to state the exact function of conjunctive words. He should show a ready and accurate knowledge of the structure of the prose sentence and the relations of its various parts to one another. For further information, see the sample examination questions in Advanced Grammar, page 34.

Many students will find it exceedingly desirable to begin their work in college in this term. Those who have had considerable algebra in the preparatory school should review its fundamental principles and become acquainted with their application in the wider and more difficult field of college work, and those who have had experience in plane geometry can to advantage supplement such study by a review of some standard text and a thorough drill in the original geometric propositions. The classes in these studies established at the beginning of the spring term furnish an excellent opportunity for students to prepare themselves thoroughly for entering upon collegiate work at the opening of the next school year.

In like manner, students who have completed grammar and have had a high school course in rhetoric have an opportunity in this term to review the principles of style and correct whatever errors they still make in ex-

pressing their thoughts. Without a thorough grounding in the principles of style and a considerable degree of accuracy in choosing words and constructing sentences, also in planning and developing paragraphs, it is practically impossible for a student to do creditable work in Freshman English. The majority of those who fail in English, fail because they were not fully prepared to do the work they attempted. In many instances the cause of failure is that the student has not been trained to apply the principles he has recited; properly directed practice in composition is far more important than the mere memorizing of rules and definitions. To begin work in this term would prepare many for a better standing throughout their course than would otherwise be possible.

REQUIREMENTS FOR ADMISSION TO FRESHMAN YEAR.

YEAR BEGINS AUGUST 27, 1901.

The requirements for admission to the Freshman Year of the agricultural and veterinary courses are about the same as those for admission to the College Academic Year, except that agricultural freshmen are required to take the two courses in Rhetoric, and also that such students as need the course in grammar are required to take it as preparatory work. In order to determine what agricultural students should take grammar, an examination will be given at the opening of the fall term.

The requirements for admission to all courses other than those in agriculture and veterinary science include, in addition to the studies necessary to enter the Academic year, standings in the studies of that year.

ENTRANCE REQUIREMENTS IN MATHEMATICS.

The examination in plane geometry will be upon the text used by the student. He should be prepared to work out original exercises.

The examination in algebra will cover the following subjects: Fundamental operations, including examples involving the use of literal, fractional and negative exponents; parentheses occurring in terms and factors; factoring; highest common factor and lowest common multiple; fractions; equations of the first degree involving one or more unknown quantities and problems leading to such equations; discussion of the forms $\frac{0}{a}$, $\frac{a}{0}$, $\frac{0}{0}$, etc.; inequalities; involution and evolution of algebraic monomials and polynomials, including the extraction of the higher roots; radicals, including the fundamental operations, rationalization, imaginary quantities, binomial surds and the solution of equations containing radicals; pure and affected quadratics; solution of quadratics by factoring; problems involving quadratics; equations solved like quadratics; simultaneous quadratic equations, and theory of quadratics. Students who have thoroughly mastered these subjects in Wentworth's New School Algebra, Well's Essentials of Algebra or text books of an equal grade and who have carefully reviewed them preparatory to taking up advanced work, ought to readily pass the required examination.

An idea of the quality of work demanded can be gained from the sample examination questions which follow:

1. Find the sum of $(3m+4n)x^3-(5a-7b)y^5$ and $(3m-4n)x^3-(2a+3b)y^5$.

2. Remove parentheses and simplify $5a^3-4y^2-[c-a^3-\{y^2-7a^3-(8y^2-c)\}-6]-(a^3-6c)$. Give and explain the use of the parenthesis preceded by a minus sign.

3. Multiply $-8z^x a^{-7}(m-n)^c(x+y)^{-4}by^8-9za^c(m+n)^y(x+y)$.

4. Separate into four prime factors $(x^2-5x)^2-2(x^2-5x)-24$.

5. Find the highest common factor of $72a^6b^2+63a^5b^2$

$-144a^4b^2+9a^3b^2$ and $18a^5b^2+9a^4b^2-27a^3b^2$.

6. Simplify $\frac{b+c}{(a-b)(a-c)}+\frac{a+c}{(b-c)(b-a)}+\frac{a+b}{(c-a)(c-b)}$.

7. Solve the equation $\frac{2x+5\frac{1}{3}}{5-6x}-3x-\frac{1-15x}{6}=\frac{8}{3}-\frac{15+9x}{18}$

8. Explain fully the principle involved in each of the following:

(a) Transposing terms.

(b) Clearing an equation of fractions.

9. A man has a house, a lot and $300 in the bank. The house and the money in the bank are equal to $\frac{4}{5}$ the value of the lot; and the lot together with the money in the bank, equals $\frac{18}{17}$ the value of the house. What is the value of the house and of the lot?

10. Expand $(-5a^3x^{-3}y^{c}z^{-4})^{-2}$ and free the result from all negative exponents.

11. Find the cube root of $1-3x+6x^2-10x^3+12x^4-12x^5+10x^6-6x^7+3x^8-x^9$.

12. Find the sum of $\sqrt[3]{54a^{m+6}b^3}$, $\sqrt[3]{16a^{m-3}b^6}$ and $\sqrt[6]{4a^{2m}}$.

13. Find the fourth root of $\frac{x}{y}\sqrt[3]{\frac{x}{y}}$

14. Divide $6a^2c^{-5}\sqrt{2a^3bc^5}$ by $2a^5c^7\sqrt[3]{4a^2b^4c}$.

15. Solve the equation $\sqrt{x-24}=12-\sqrt{x}$

16. Find the square root of the binomial surd $67+7\sqrt{72}$

17. Find the product of $4x\sqrt{3}-5y\sqrt{-6}$ and $5x\sqrt{3}+7y\sqrt{-6}$.

18. Solve the equation $\sqrt{x-3} - \sqrt{2x-8} + 1 = 0$.

19. Solve the equations
$$\frac{x}{y} + \frac{y}{x} = \frac{29}{10}$$
$$3x - 2y = 4$$

20. A rectangular garden is surrounded by a walk 7 feet wide; the area of the garden is 15,000 square feet, and of the walk 3696 square feet. Find the length and breadth of the garden. Explain fully.

ENTRANCE REQUIREMENTS IN ENGLISH.

The applicant should show thorough preparation in English, including grammar and elementary rhetoric, and not over-looking spelling, reading, and punctuation. A student who spells poorly will be conditioned in English courses until he is able to spell with comparative accuracy. The applicant should understand the words in current use in good modern prose, and should be able to read aloud with that ease and fluency that betoken a correct understanding of what he reads. His knowledge of grammar should enable him to classify words according to their grammatical properties, to give their inflections and to identify each form, to analyze in detail sentences of modern prose, and, above all, to construct sentences correctly. He should have given sufficient study to punctuation to enable him to use the marks correctly in his own compositions. His knowledge of rhetoric is best tested, not by his readiness to give definitions, but rather by his ability to apply his knowledge of rhetorical principles in his own speech and composition. His speech should be free from gross errors and awkward constructions, and he should be able to write with a fair degree, not only of correctness, but also of ease. For such training, more depends upon the teacher than upon the text-book, but the method pursued in a book like Scott and Denney's "Composition-Rhetoric" is likely in general to produce the best results.

An idea of the extent and nature of the ground covered may be gained from the following set of sample examination questions in English:

PREPARATORY GRAMMAR.

(For admission to the first term of the Academic Year.)

I. (a) Decline I, it, lady, dog, and Charles.

(b) Compare noisy, ill, and remarkable.

(c) Write the principal parts of go, see, ride, sleep, and try.

II. Define (a) proper noun, (b) personal pronoun, (c) descriptive adjective, (d) intransitive verb, (e) passive voice, (f) subordinate conjunction.

III. Name the different kinds of nouns, of adjectives, and of pronouns, and give an example of each.

IV. In the following sentence tell what part of speech each word is: "The deacon did not stop to speak to her, but after a moment's thought placed the precious wallet under the pillows."

V. Analyze this sentence: "This act was followed by another moment's reflection, and as the old man turned, his son stood before him in the doorway."

VI. Parse the italicized words: "*These* are not *my books*. I *think they* must belong to *some* of the boys. *What* boys have been *here since* I left?"

ADVANCED GRAMMAR.

(For admission to the second term of the Academic year).

I. Conjugate *strike* in the present perfect, past, and past perfect tenses of the indicative mood, passive voice.

II. Define (a) personal pronoun, (b) demonstrative adjective, (c) abstract noun, (d) impersonal verb, (e) active voice, (f) indirect object, (g) attribute compliment.

III. (a) Name the principal uses of the subjunctive mood. (b) How does it differ in form from the indicative?

IV. (a) Decline *martyr*, *baby*, *ox*.

(c) Compare *lazy industrious*, *ill*.

(c) Give the principal parts of *throw*, *lie*, *lay*, *sit*, *set*, and *ride*.

V. Distinguish between *shall* and *will* in (a) the first person, (b) the third person.

VI. Parse the underscored words: "*To avoid the possibility of being misunderstood, allow me to repeat* again, in the fullest manner, *that* I claim no powers for the government by *forced* or unfair construction."

VII. In the following sentence state what each phrase modifies and how: "In pursuance of these clear and express provisions, Congress established, at its very first session, in the judicial act, a mode for carrying them into full effect, and for bringing all questions of constitutional power to the final decision of the supreme court."

VIII. In the following sentence state the office of each clause, and point out the subject, verb, and complement of each: "It is a duty which the people, by the constitution itself, have imposed on the state legislatures, and which they might have left to be performed elsewhere, if they had seen fit."

IX. Punctuate: "I would not perplex a young mind with punctuation as a system or with nice questions between semicolons and colons but every one should at an early age be taught the difference between the period and the comma and the principal functions of each every one should be taught too the great principle that a point serves as a guide to the construction and through the construction to the meaning of the sentence."

X. Read your paper through to see that it is punctuated correctly.

ELEMENTARY RHETORIC.

(For admission to the first term of the Freshman year)

I. In the following sentence, (a) state the exact grammatical office of each phrase; (b) parse the underscored words; (c) account for the punctuation: "*During* the first half century of our national life we *seemed to have succeeded* in an extraordinary degree in *approaching* our *ideal*, in or-

ganizing a nation for counsel and co-operation, *and* in moving forward with cordial unison *and* with confident and buoyant step *toward* the accomplishment of tasks and duties upon *which* all were *agreed*."

II. Correct the following sentences, and explain the correction:

1. John writes as well or better than Henry.
2. Tom was laying on the floor when I come in.
3. He haint got nothing to worry about.
4. If I was him I would of done it long ago.

III. Discuss fully and carefully four of the following topics:

1. The practical value of rhetoric.
2. The essential qualities of the paragraph.
3. The respective advantages of the short sentence, the long sentence, and the periodic sentence.
4. Define purity, propriety, and precision, and state why each should be observed.
5. The topic sentence; what it is, its position, its value.
6. The best method of amplifying a general statement; give an example.

IV. Write an essay of from 250 to 350 words on two of the following topics:

1. My reasons for desiring a college education.
2. A striking contrast—persons, places, or things.
3. A trying experience.
4. A visit to ————————.

Note—These essays are considered an important part of the examination. They will be graded mainly on diction, sentence structure and connection, and paragraphing. Good penmanship, neatness of manuscript, and correct spelling and punctuation are also important.

ENTRANCE REQUIREMENTS IN HISTORY.

For admission to the work in history for the First Term of the Academic Year the student is expected to pass a satisfactory examination in United States history. Stand-

ings from accredited schools are accepted in lieu of this examination.

For admission to the work in history for the Second Term of the Academic Year, standings in general history from accredited high schools are accepted in lieu of an examination on the work in history for the First Term of the Academic Year.

Standings from high schools are not accepted in lieu of the work in history for the Second Term of the Academic Year except from such schools as give a special course in English history.

ENTRANCE REQUIREMENTS IN FREE-HAND DRAWING.

For admission to the First Term of the Academic Year no previous work in drawing is required.

The standings of students from high schools giving courses in free-hand drawing may be accepted in lieu of the work in free-hand drawing for the First Term of the Academic Year.

The work in free-hand drawing of the Second Term of the Academic Year (for engineering students only) will be required of all entering engineering students who cannot demonstrate proficiency in sketching parts of machines and a knowledge of the principles of projection and of dimensioning, and facility in plain free-hand lettering.

EXAMINATION AT HOME.

The heads of the English and mathematical departments will cheerfully unite with principals of schools in arranging for such examinations in grammar, rhetoric, algebra, and geometry as will admit students to our freshman class. Candidates can arrange also to have questions for examination sent to county superintendents or other school officers who are willing to conduct the examination. The papers will be forwarded to the heads of the English

and Mathematical departments, who will mark the same and notify the applicant of the record received.

The attention of applicants for admission is particularly called to this arrangement, by which all their entrance examinations can be taken at a convenient place near home.

ADMISSION ON DIPLOMA.

SCHOOLS FULLY ACCREDITED.

The following list of accredited schools has been prepared by the Committee on College Entrance Requirements appointed by the State Teachers' Association. The graduates of these schools will be admitted to the first term of the freshman year upon the presentation of a diploma showing that the candidate has completed one of the long courses. The students thus admitted will take review work in English and algebra during the first ten days of the term.

In English this work will be a series of written exercises designed to test the student's ability to express his thoughts clearly and correctly. In grading these exercises the points that will be considered include spelling, punctuation, diction, sentence structure from the grammatical and also the rhetorical standpoint, and paragraph structure.

In algebra all subjects up to and including quardatics will be treated and the ability of the student to demonstrate principles and solve examples and problems will be tested.

At the close of this review students will be assigned to such work in English and mathematics as the professors in charge of these departments shall consider them fitted to undertake. Credits in these branches will be given only as students complete the respective courses set forth in the detailed statement of the work of these departments. A review of one week in plane geometry will be given at

the beginning of the second term and assignments in geometry made in accordance therewith.

SCHOOLS FULLY ACCREDITED.

Ackley,
Adel,
Albia,
Algona,
Ames,
Anamosa,
Atlantic,
Avoca,
Bedford,
Belle Plaine,
Boone,
Britt,
Brooklyn,
Burlington,
Capital Park,
Carroll,
Cedar Falls,
Cedar Rapids,
Cedar Valley Sem., Osage,
Centerville,
Charles City,
Charles City College Prep.,
Cherokee,
Clarinda,
Clarion,
Clinton,
Columbus Junction,
Corning,
Corydon,
Council Bluffs,
Cresco,
Creston,
Davenport,
Decorah,
Decorah Institute,
Denison Normal School,
Denison,
Decorah Institute,
Des Moines, E.,
Des Moines, N.,
Des Moines, W.,
Dexter Normal School,
Dubuque,
Eagle Grove,
Eldora,
Emmetsburg,
Epworth Seminary,
Estherville,
Fairfield,
Forest City,
Ft. Dodge,
Ft. Madison,
Geneseo, Ill.,
Glenwood,
Greene,
Greenfield,
Grinnell,
Guthrie Center,
Guthrie County.
Hamburg,
Hampton,
Harlan,
Humboldt,
Ida Grove,
Independence,
Iowa City,
Iowa City Academy,
Iowa Falls.
Jefferson,

Keokuk,
Knoxville,
Lake City,
Lamoni,
Le Mars,
Leon,
Lyons,
Manchester,
Maquoketa,
Marengo,
Marion,
Marshalltown,
Mason City,
McGregor,
Michigan Military Academy,
Missouri Valley,
Moline, Ill.,
Montezuma,
Monticello,
Mount Ayr,
Muscatine,
Nashua,
Nevada,
New Hampton,
Newton,
Odebolt,
Onawa,
Osage,
Osceola,
Oskaloosa,
Ottumwa,
Parkersburg,
Perry,
Red Oak,
Reinbeck,
Rockford,
Rock Rapids,
Sac City Institute,
Sanborn,
Sheldon,
Shenandoah,
Sibley,
Sigourney,
Sioux City,
Spencer,
Storm Lake,
Stewart,
Taylorville Twp.,
Taylorville, Ill.,
Tipton,
Traer,
Urbana Schroeder Academy,
Villisca,
Vinton,
Washington,
Washington Academy,
Waterloo, E.,
Waterloo, W.,
Waverly,
Waukon,
Webster City,
Whittier College,
Williamsburg,
Wilton,
Wilton-German-English Coll.
Woodbine Normal School,

SCHOOLS NOT FULLY ACCREDITED.

The following list of schools not fully accredited has been prepared by the Committee of the State Teachers' Association. Graduates of these schools will be admitted

to the review work of the second term of the Academic Year on presentation of a diploma showing that the candidate has completed one of the long courses.

LIST OF SCHOOLS NOT FULLY ACCREDITED.

Adair,
Allerton,
Anita,
Audubon,
Bloomfield,
Brighton,
Calhoun Co. Normal School,
Chariton,
Charter Oak,
Clearfield,
Cedar Lake,
Colfax,
Coon Rapids,
Correctionville,
De Witt,
Dysart,
Eldon,
Elkader,
Exira,
Farmington,
Fayette,
Fonda,
Fontanelle,
Garner,
Glidden,
Grand Junction,
Grundy Center,
Hartley,
Hawarden Nml. School,
Holstein,
Hubbard,
Keosauqua,
Kingsley,
Lake Mills,
Lime Springs,
Manning,
Mapleton,
Mechanicsville,
Milton,
Morning Sun,
Moulton,
Mount Pleasant,
Neola,
New Sharon,
Nora Springs Seminary,
North English,
Northwood,
Oak Park,
Oelwein,
Orange City,
Pella,
Riceville,
Richland,
Rolfe,
Sac City,
St. Ansgar's Seminary,
Shelby,
Sioux Rapids,
Springdale,
Springville,
State Center,
Tabor,
Tama City,
Victor,
Wapello,
West Union,
Winfield.

HOW TO ENTER THE COLLEGE.

Persons who desire to enter the College as new students should comply with the following directions.

1. Comply with the "Requirements for Admission" on the pages immediately preceding this. Then write to the President, asking for a "Card of Inquiry."

2. On receiving the card write an answer opposite each question and mail the card to the President. If the answers you give accord with the "Requirements of Admission," a card of introduction will be sent you, which entitles you to admission on passing the examination, or presenting your diploma.

3. If you desire to room in a college building write to the Steward of the Iowa State College, enclosing $3.00 to retain a room, and ask for its number, dimensions, etc., that you may bring proper carpet and furniture, or purchase here.

4. If you desire to room in a college building, when you arrive at the College proceed at once to the Steward's Office in Margaret Hall. Register your name and secure the key to your room.

Next see the College Treasurer in his office just south of the Main Building, make the required deposits for room and board taking his receipt therefor, which receipt, together with your card of introduction should be immediately presented to the President in his office in the same building for your entrance and classification. If you have a diploma, present it at this time.

5. Present the card of classification to each of the teachers having charge of the classes to which you are assigned.

6. If you desire a room in private family outside of the college buildings indicate this by letter to Mr. J. F. Cavell, the Steward, Ames, Iowa, and on your arrival at the college the reception committee or steward will direct you to your location.

THE CLASSIFICATION OF STUDENTS.

A student who fails to secure the required pass-mark* in any study must make up that study before it is taken by the next College class, or classify *back* with the class in this study. If his mark is below 2.75 on a scale of 4.00 in an Academic or Freshman study or below 3.00 in a Sophomore, Junior or Senior study, he will not be permitted to make up the work by himself, but *must take it over again with the next class.*

To enable students to make up back studies, such examinations as may be necessary will be held during the first full calendar week of each term. At the beginning of the year in September, no student can classify for promotion with his class until he has passed a satisfactory examination in all studies but one "five hour study," and that study must be passed by the end of the first week *of the next term.*

STUDENTS' EXPENSES AND EQUIPMENT.

No charge is made for tuition to Iowa students. To those who come from outside the state $30.00 tuition per year may be charged, unless remitted to worthy students by special vote of trustees, on recommendation of the Faculty.

The current expenses of students during the year are as follows:

Every student entering College shall, before being classified pay a—

Janitor fee of.....$5.00

In the Main College Building, Margaret Hall and Creamery—

Board, per week.....$2.75
Lighting, heating and incidentals, per week.. .55
Room rent, per term..... 3.00

*The pass-mark for Academic and Freshman studies is 3.00 on a scale of 4.00. For Sophomore, Junior and Senior studies the pass-mark is 3.25.

*Hospital fee, per term..... 2.50

In the Cottages—

Board, per week.....$2.75
Fuel, lighting and incidentals, per week.... .40
Room rent, per term..... 3.00
*Hospital fee, per term..... 2.50

As security for the payment of bills, students living in the College Buildings and boarding in the College dining hall are required to deposit with the Treasurer.....$25.00

Students rooming outside of College buildings and boarding in College dining hall are required to deposit with the Treasurer.....$15.00

These deposits will be returned on final settlement at the close of term.

All bills for each month must, without fail, be settled at the Treasurer's office by the second Saturday of the month following.

Students using laboratories in the various departments of the College are required to make deposits at the beginning of each term to cover expenses of breakage, etc., thus incurred and the professors in charge require the Treasurer's receipt for such deposits before admitting the students to laboratory practice.

For amounts of such deposits see department courses.

Students purchasing Military uniforms will deposit $5.00 with the merchant tailor at the time measures are taken paying the remainder on delivery.

The dining room will be opened on the evening preceding the respective days on which the first and second terms commence. *No allowance on board bills is made for absence.* Students and others who bring guests to their tables are required to purchase meal tickets. All students are required to board and room in the college dormitories, except when permission to board elsewhere has been for good reasons granted by the President.

For board, heating, lighting, cleaning and care of the college buildings students pay less than the items actually

*See terms of Hospital Department, page 46.

cost the institution. Injury to college property, of whatever sort, is charged to the author, when known; otherwise to the section or to the entire body of students, as may seem just in the given case.

Students who board in any of the college buildings, **furnish their own bedding and all furniture for their rooms,** excepting bedsteads, washstands, tables and wardrobes.

Each student rooming in a college building will provide himself with the following articles:

1 Chair.
1 Looking-glass.
1 Wash-basin and ewer.
1 Slop-pail.
6 Towels.
4 Table napkins.
6 Sheets—for single bed.
3 Pillow cases.
Pillow and mattress as may be desired.
Bed clothes (blankets or comfortables) as required.

Students are earnestly advised to bring from home, carpets, etc., **to make their rooms comfortable and cheerful.** Male students in the two lower classes, not physically disabled, are required by law to take the military drill and purchase uniforms therefor. "Physical disability" must be certified to by the College Physician, on examination.

Text books and stationery may be purchased at the College Book Store, at about twenty-five per cent below the average retail prices.

COLLEGE HOSPITAL.

The actual sanitary condition of the College is excellent. The buildings are situated on high ground with good natural drainage. The water supply is exceptionally pure and abundant.

The sewer system and sewage disposal plant are the best that modern sanitary engineering can devise. Never theless, in this, as in other like institutions, whose students are drawn from a wide territory, various diseases are

brought here by the students themselves. In order to control epidemics and properly care for other cases of illness or injury among the students of the College a neat and commodious hospital building is provided. This building is heated by furnaces, lighted by gas, and has perfect sanitary plumbing. This hospital is under the charge of the College Physician assisted by a professional nurse and a competent house-keeper.

The expenses of the hospital are defrayed from a fund accruing from hospital fees paid by students.

The hospital fee insures to the payer thereof medical attendance, nursing and medicine in illness or accident and consultation and medicine for minor ailments, in acordance with the regulations published below.

The privileges of the hospital are also extended to students not rooming in the College buildings, provided 1st that no calls shall be made by the physician at their residence and 2nd, that the usual hospital fee is made within the first ten days of the term. The hospital has proved to be a great blessing to the students and the insurance is placed at actual cost.

The following regulations apply to the privileges of the hospital:

1st. The hospital fee for the term is fixed at $2.50, and is required of all students living in College buildings.

2nd. Students entering the hospital shall be charged $3.00 per week for board, fires and lights. No other charge on these accounts shall be made by the college during the time the student is in the hospital.

3rd. For any time in excess of three consecutive weeks per term spent in the hospital an additional charge above that mentioned, shall be made of $4.00 per week.

4th. In case a special nurse or physician is employed the expense shall be borne by the particular patient. The selection of such physician or nurse to be approved by the college physician.

5th. Students not making the hospital deposit will be admitted to all the privileges of the hospital allowed stu-

dents making the deposit upon the basis of a charge of $10.00 per week.

6th. The College physician is authorized to exclude from the College dormitories and recitation rooms any person afflicted with a contagious disease.

7th. The privileges of the hospital shall not be extended to cases of small-pox.

8th. The College assumes no responsibility whatever and the Hospital Fee of $2.50 does not provide for medical attendance, nurses, medicine or other expenses incurred in treating or caring for students afflicted with small-pox.

9th. The President and College Physician shall require of students entering College a certificate of a reputable physician showing a successful vaccination.

10th. The charges named are based upon the probable actual cost of medical attendance and hospital service, and the fund created will be carefully devoted to those purposes. The College can not assume any liability beyond the extent of the fund so created.

MANUAL LABOR.

SHOP, LABORATORY AND FIELD PRACTICE.

The following regulations in regard to manual labor have been adopted by the Board or Trustees:

1. The manual labor of students is divided into two kinds, viz.: Uninstructive labor, which shall be paid for in money, and instructive labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructive labor shall comprise all the operations in the workshop, the garden, upon the farm and elsewhere, in which the work done accrues to the benefit of the College and not to that of the student. Instructive labor shall embrace all those operations in the workshop, museum, laboratories, veterinary hospital, experimental kitchen, upon the farm, garden and experimental stations,

in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructive labor in the presence and under the instruction of the professor in charge according to the statement made in each of the courses of study.

The compensated labor furnished by the Divisions of Agriculture, Veterinary Medicine and of Engineering, is given by each to its own students, and is eagerly sought. The "details" of compensated labor supplied by the needs of the various departments are given to the most faithful and meritorious students in each department. Uninstructive labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor while here. The College cannot furnish the work, and even if it could, the student's time is *chiefly needed for study.* Still, many worthy and industrious students pay a considerable part of their expenses by labor, over $3,000 being paid out by the College thus each year to students and post-graduate assistants.

GOVERNMENT.

The relations of our College buildings, and the nature of the exercises, complicated as they are by laboratory work, shop practice and labor, make order, punctuality and systematic effort indispensable. This institution, therefore, offers no inducements to the idler or self-indulgent. All who are too independent to submit to needful authority, or too reckless to accept wholesome restraint are not advised to come. The discipline of the College is confined mainly to sending away promptly those who prove on fair trial to be of the said class.

The use of tobacco by students on the College premises is forbidden. Those who are already so addicted to its use that they cannot cheerfully submit to this regulation are advised not to come. Of course the use of intoxicating beverages and of profane and obscene language is forbidden.

PUBLIC WORSHIP.

Officers and students gather daily in the chapel at 7:00 P. M. for public worship, except on Wednesday, when the time from 7:00 to 7:30 P. M., is devoted to Y. M. & Y. W. C. A. meetings, and on Saturday, when there are no College exercises. On Sunday morning at 10:45 a discourse is given in the chapel by a clergyman invited for the occasion. The object of these services is to emphasize and enforce the principles of morality and of the Christian religion. Being a state institution we give the utmost freedom to all creeds and forms of belief, avoiding the controversies of sectarianism.

The faculty requires on Sunday such conduct and decorum in and about the College buildings as befit the observance of the Sabbath.

RELIGIOUS ASSOCIATIONS.

The Young Men's and Young Women's Christian Associations of the College are voluntary organizations, composed of students and members of the faculty. The membership is large. The Sunday school, Bible classes and prayer meetings are under their direction, and are well attended and profitable. This voluntary Christian influence in the College is strong and healthful.

LITERARY AND TECHNICAL SOCIETIES.

Seven excellent literary societies hold their meetings each Saturday evening, and serve to supplement the literary work of the College. On that ground they are recognized by the College, given rooms and an entire evening each week, free from study or other exercises. Every student is advised to join one of these societies.

Thre is a Veterinary Society, an Economic Association and an Agricultural and Horticultural Association, in the exercises of which members of the faculty and students

interested take part. In addition most of the departments carry on *seminar* work.

COURSES OF STUDY.

Eight courses of study, leading to the following degrees are offered:

1. The course in Agriculture, of four years leads to the degree of Bachelor of Scientific Agriculture, (B. S. A.)

2. The course of Veterinary Medicine, of three years leads to the degree of Doctor of Vetrinary Medicine, (D. V. M.)

3. The course in Mechanical Engineering, of four years leads to the degree of Bachelor of Mechanical Engineering, (B. M. E.)

4. The course in Civil Engineering, of four years leads to the degree of Bachelor of Civil Engineering, (B. C. E.)

5. The course in Electrical Engineering, of four years leads to the degree of Bachelor of Science in Electrical Engineering, (B. Sc. IN E. E.)

6. The course in Mining Engineering, of four years leads to the degree of Bachelor of Science in Mining Engineering, (B. Sc. IN MN. E.)

7. The course in Technology, of four years leads to the degree of Bachelor of Science, (B. Sc.)

8. The course in Science as Related to the Industries of four years leads to the degree of Bachelor of Science, (B. Sc.)

9. The course in General and Domestic Science, for women, of four years leads to the degree of Bachelor of Science, (B. Sc.) Ladies may take any other course desired.

For the short courses in Agriculture and Dairying, certificates properly indicating the completion of certain studies will be given.

For the short courses in Mining and Ceramics, certificates will be given.

SPECIAL LINES OF STUDY.

Any person of mature age and good moral character, who desires to pursue studies in any department of instruction of the College, and who is not a candidate for a degree, will, upon application to the president, be admitted upon the following conditions: (1). He must meet the requirements for admission to the Freshman class, and pass such special examinations as the professor in charge of the department selected shall deem essential to a profitable pursuit of the work. (2). He shall confine his work strictly to the line of study chosen at the time of admission, and shall take enough class work, laboratory and other practice equivalent to work required of regularly classified students. (3). He shall submit to the same requirements in daily recitations and examinations, with students in the regular courses.

Students who have pursued thus a special line of study in the institution, will, upon application to the faculty, be granted the College Certificate showing their standing in such studies.

GRADUATING THESES.

The subjects of theses shall be selected under direction of the professor in whose department they are written, and submitted to the Thesis Committee, with signed approval of the Proefssor, on or before the first Monday in October.

It is expected that each thesis shall represent an amount of work equivalent to at least one exercise per week through the Senior Year; that it shall show the result of the student's personal study or investigation and be throughout original in matter and treatment so far as the nature of the subject will permit; that it shall be prepared under the supervision of the professor in charge, the student making frequent reports of progress and having an outline of matter ready for approval by the first week of the last term.

The thesis, ready for examination and marking, with its specific title and the written approval of the professor in

charge, shall be presented to the Thesis Committee at a date fixed by the Committee during the four weeks preceding the Commencement Day.

ADMISSION TO ADVANCED STANDING.

Graduate and undergraduate students of other colleges will be admitted and granted such credits as their work will justify. Work of recognized merit that has been taken at colleges or universities of good rank and standing will be credited for an equivalent amount of work so far as it applies in any of the courses offered at this college. Students taking up work in this way will consult the heads of departments to ascertain the credits to be allowed; these credits may at the option of the head of the department be conditioned on satisfactory work during the student's first term in college.

POST GRADUATE DEGREES.

The degrees which are conferred by the faculty in connection with the post-graduate courses of study offered by the various departments of the College are as follows:

1. The degree of Master of Science (M. Sc.) is open to Bachelors of Science who are graduates of the Course in Science of this College.

2. The degree of Master of Scientific Agriculture (M. S. Ag.) is open to graduates of the Four Years' Course in Agriculture of this College.

3. The degree of Mechanical Engineer (M. E.) is open to Bachelors of Mechanical Engineering, and to Bachelors of Science before 1878, who are graduates of the Mechanical Engineering Department of this College.

4. The degree of Civil Engineer (C. E.) is open to Bachelors of Civil Engineering and to Bachelors of Science before 1878, who are graduates of the Civil Engineering Department of this College.

The Faculty will recommend for the above degrees candidates otherwise qualified who shall comply with the regulations given below.

The opportunity of resident study after graduation is a privilege granted only upon recommendation of the President and the Professor in charge of the studies to be pursued, and only to students whose conduct and scholarship in College seem to warrant the granting of the privilege.

REGULATIONS FOR THE SELECTION OF STUDIES AND CONDITIONS FOR GRANTING POST-GRADUATE DEGREES.

I. No undergraduate course of study can be selected for a major post-graduate. The minor study shall be approved by the Committee on Post-Graduate Studies and the Professor in charge of the study.

II. The major and minor subject shall be related in such a manner as to support and strengthen one another.

III. The major course of study must be of the nature of original research, original in the sense that it is to be independent work covering a field not thoroughly investigated before, to include, however, whatever may be necessary in the way of comparing various methods of investigation.

IV. The minor course to be left to the discretion of the professor giving the course.

V. The major and minor subjects while they must be closely related, must be taken in different departments.

VI. The length of time which a student must devote to his studies is one year. To the major subject there must be given two-thirds and to the minor one-third of the time.

VII. Between the Bachelor's degree and the Post-graduate degree there shall intervene at least two years, of which one year (the second preferred) shall be wholly devoted to resident study at this institution, and the first

year to work in the chosen line, either in teaching, in studying, or in professional work.

VIII. Graduates of other institutions desiring to become candidates for post-graduate degrees in this institution shall be required to show to the committee on post-graduate study evidence of undergraduate work equivalent to the corresponding course in this institution, or if any deficiency appear, to make up such deficiency.

IX. Applications for post-graduate work shall be made to the Faculty by those who may desire to pursue such a course of study at this institution and such applications should be outlined in both subjects, major and minor studies, by the professors under whom the course of study is to be taken. The student should also thoroughly understand the course of study outlined for him so that he can begin and continue his work with a definite object in view. The application and the outline of study must be submitted to the professor in charge of the department in which the study is taken and approved by him before it is presented to the Faculty.

X. Each candidate for the degree of Master of Science shall be required to present to the college library one hundred printed copies of his thesis, such copies to be designated by serial number in such manner as shall be required by the Thesis Committee.

XI. As a condition for the granting of an advanced degree each candidate must have a reading knowledge of French or German.

XII. Each resident student must apply in writing for examination at least six weeks before the annual meeting of the Board of Trustees, stating explicitly the subject in which he desires to be examined, and at the time of the examination (which may be four weeks before the meeting of the Board) he must present to the Faculty his final thesis.

Instruction and opportunities for advanced study are given in the following branches to post-graduate students,

provided that under-graduate work shall not qualify a student for a post-graduate degree:

1. Practical Agriculture, major or minor in
   (a) Field Crops.
   (b) Farm Management.
   (c) Drainage.

2. Dairying, major or minor in
   (a) Butter Making.
   (b) Cheese Making.
   (c) Farm Dairying.
   (d) Dairy Bacteriology.

3. Animal Husbandry, major or minor in
   (a) Study of Breads.
   (b) Stock Judging.
   (c) Practical Management of Stock.
   (d) Feeds and Feeding.
   (e) Heredity.

4. Horticulture, major or minor in
   (a) Pomology.
   (b) Olericulture.
   (e) Forestry.

5. Agricultural Chemistry, major or minor in
   (a) Organic Agricultural Chemistry.
   (b) Inorganic Agricultural Chemistry.

6. Veterinary Medicine.

7. Mechanical Engineering, major or minor in
   (a) Advanced Machine Design.
   (b) Advanced Experimental Engineering.

8. Civil Engineering, major or minor in
   (a) Framed Structures.
   (b) Sanitary Engineering.
   (c) Water Works Engineering.

9. Electrical Engineering, major or minor in
   (a) Theory of Alternating Currents.
   (b) Electrical Design.

10. Physics, major or minor in
    Theoretical and Experimental Physics.

11. Chemistry, major or minor in
    (a) Inorganic Chemistry.
    (b) Organic Chemistry.

12. Botany, major in
    (a) Cytology.
    (b) Systematic Botany.
    (c) Morphology.

    Minor in
    (a) Economic Botany.
    (b) Mycology.
    (c) Bacteriology.

13. Zoology, major or minor in
    (b) Vertebrate Morphology.
    (a) Entomology, Economic or Systematic.

14. Domestic Science.

DIVISION OF AGRICULTURE.

PRACTICAL AGRICULTURE.
DAIRYING.
ANIMAL HUSBANDRY.
HORTICULTURE.
AGRICULTURAL CHEMISTRY.

OFFICERS OF INSTRUCTION.

W. M. BEARDSHEAR, LL. D., PRESIDENT.
President.

*JAMES WILSON, M. S. AG.,
Dean of the Division of Agriculture.

CHARLES F. CURTISS, B. SC., M. S. AG.,
Director of Experiment Station and Professor of Agriculture

**J. L. BUDD, M. H.,
Professor Emeritus of Horticulture.

JULIUS BUEL WEEMS, PH. D.,
Professor of Agricultural Chemistry.

JOHN ALEXANDER CRAIG, B. S. A.,
Professor of Animal Husbandry and Assistant Director of Experiment Station.

GEORGE LEWIS McKAY,
Professor of Dairying.

HOMER C. PRICE, M. S.,
Professor of Horticulture and Forestry.

CLARENCE HENRY ECKLES, B. AG., M. SC.,
Instructor in Dairy Bacteriology.

JOSEPH J. EDGERTON, B. AG.,
Instructor in Agricultural Physics and Foreman.

JAMES ATKINSON, B. S. A.,
Instructor in Agriculture.

ARTHUR T. ERWIN,
Instructor in Horticulture.

ED. H. WEBSTER, B. S. AG.,
Instructor in Dairying.

*Granted indefinite leave of absence as Secretary of Agriculture.
*Resigned, December, 1898.

C. E. ELLIS, B. S. A.,
Instructor in Agricultural Chemistry.

EDWARD E. LITTLE, B. S. Ag.,
Assistant in Horticulture.

HENRY PALMER, B. S. Ag.,
Assistant in Dairying.

F. R. MARSHALL, B. S. A.,
Assistant in Animal Husbandry.

EDGAR WILLIAM STANTON, M. Sc.,
Professor of Mathematics and Economic Science.

M. STALKER, V. S.,
Lecturer in Veterinary Science.

GEN. JAMES RUSH LINCOLN,
Professor of Military Science.

LOUIS HERMAN PAMMEL, B. Ag., M. Sc., Ph. D.,
Professor of Botany.

GEORGE WELTON BISSELL, M. E.,
Professor of Mechanical Engineering.

ANSON MARSTON, C. E.,
Profesor of Civil Engineering.

MISS LIZZIE MAY ALLIS, M. A.,
Professor of French and German.

LOUIS BEVIER SPINNEY, B. M. E., M. Sc.,
Professor of Physics.

SAMUEL WALKER BEYER, B. Sc., Ph. D.,
Professor of Geology.

ALVIN B. NOBLE, B. Ph.,
Professor of Rhetoric and English Literature.

HENRY E. SUMMERS, B. S.,
Professor of Zoology.

ADRIAN M. NEWENS, B. O.,
Professor of Elocution and Associate in English.

JOHN J. REPP, V. M. D.,
Professor of Pathology and Therapeutics.

ORANGE H. CESSNA, B. Sc., D. D.,
Professor of History, Psychology and Ethics.

LOUIS A. KLEIN, V. M. D.,
Professor of Veterinary Medicine, Sanitary Science and Physiology.

JOHN H. M'NEALL, V. M. D.,
Professor of Anatomy and Surgery.

TALBOT LENNOX,
Instructor in Dairy Machinery.

EZRA C. POTTER,
Instructor in Wood Work.

EDWIN CLARK BOUTELLE, B. M. E.,
Instructor in Forge Work.

MISS BESSIE B. LARRABEE, A. B.,
Instructor in Latin and English.

ERNEST ALANSON PATTENGILL, B. S.,
Instructor in Mathematics.

E. B. TUTTLE, B. Sc. IN E. E.,
Instructor in Physics.

MISS ESTELLA PADDOCK,
Instructor in Botany.

MISS IDA S. SIMONSON, B. L.,
Instructor in English.

MISS ELIZABETH MACLEAN, M. Di.,
Instructor in English.

L. RUSSELL WALKER, B. Sc.,
Instructor in Zoology.

F. W. FAUROT, B. Sc.,
Instructor in Botany.

MISS JULIA COLPITTS, M. A.,
Instructor in Mathematics.

W. L. JOHNSON, D. V. M.,
Demonstrator of Anatomy.

MISS VINA ELETHE CLARK,
Librarian.

MISS OLIVE E. STEVENS, B. L.,
Assistant Librarian.

COURSES OF STUDY IN AGRICULTURE.

The instruction in agriculture is divided into the following departments:

I. Department of Practical Agriculture.
II. Department of Dairying.
III. Department of Animal Husbandry.
IV. Department of Horticulture.
V. Department of Agricultural Chemistry.

The courses of these several departments unite in making a foundation for the student upon which he can build a successful career as a farmer, or develop into a specialist in the many possible lines that are branches of the farming industry. The studies pursued in each department are equally recognized as being necessary to fully equip the student for the highest order of work in any division of agriculture, and the only difference between the shorter and the longer courses is due to the degree to which the student wishes to specialize and develop himself for a single line of work. The farm as it is commonly conducted is a union of many divisions of industry and the shorter course confines itself to laying a foundation that will secure success in all of these, while the longer course seeks to direct the student into that line which will call forth and centralize his special ability and at the same time enable him to meet the variety of conditions that under all circumstances surround a successful life.

Past experience with the courses of these departments shows that they have met with more than the usual success in attaining their objects; as the shorter course has been productive of many successful farmers, and the longer course has been unusually successful in developing better farmers and more capable men in practical life, and also

in securing for our graduates prominent positions in the agricultural faculties of other colleges.

DEPARTMENT OF PRACTICAL AGRICULTURE.

CHARLES F. CURTISS, PROFESSOR.

JAMES ATKINSON AND JOSEPH J. EDGERTON, ASSISTANTS.

In practical agriculture, a field unsurpassed by any other college in the United States is open to the students. The national government gives to the College about thirty-five thousand dollars annually for original experimentation and instruction in agriculture, and the sciences related to the industries. This enables the College authorities to make the fields and the barns veritable laboratories of extensive and most practical investigation and observation. The range is from the soil that produces, through all of its natural characteristics, to whatever is grown in agriculture from germ to finish. A live stock room is set apart in Agricultural Hall in connection with one of the best recitation rooms, into which live animals are brought in the presence of the teacher and the class for careful study and intimate knowledge, and a commodious, well-lighted stock judging pavilion has been constructed especially for this work. An experimental barn with the recent and most approved methods of stalls, feeding and ventilation, is devoted exclusively to the original work of animal husbandry.

This work ranges over all the questions of breeding and maturing domestic animals.

The agricultural school is designed to teach the sciences that underlie practical agriculture, and sufficient English literature, mathematics, history, and other supplementary studies to sustain both scientific and practical agriculture, and to develop the agricultural students to the intellectual level of the educated in any profession. Special attention is given to the improved methods in all of the various operations of farming, farm building, using tools and machinery, and management of all kinds of stock and

crops. The instruction in this department embraces principles and practice of agriculture.

The farm consists of 800 acres of rolling prairies, bottom, and woodland, and is stocked with good representatives of six breeds of horses, six breeds of cattle, seven breeds of sheep, and six breeds of hogs. These animals are used in class illustration and for the various experiments in breeding and feeding for milk, meat, wool, growth and maintenance, conducted by the Experiment Station as a department of the College. All the crops of the farm are grown for some educational purpose; all the animals are fed by rule and system, and the result of their management reported upon, and used in class work. Labor is not compulsory, but students in the agricultural course are given work that is educational and parallel with their studies. Some students pay for their board by work in the mornings and evenings. Under direction of the professor in charge, students assist in conducting experiments in lines related to their studies.

COURSE I.—*Principles of Mechanics and Heat and Meteorology,* (Physics, V., and Geology, I) in the first term, Sophomore Year, is a course of instruction in the scientific principles and mathematical formulæ governing the subjects named. Professors Spinney and Beyer.

COURSE II.—*Agricultural Physics,* second term, Sophomore Year. In this subject students are taught to apply the principles of Course I to the problems of the farm and the operation of farm machinery. Mr. Edgerton. Lectures and laboratory.

COURSE III.—*Soil Physics,* first term, Junior Year, includes a careful study of the physical condition of the soil essential to the best utilization of plant food, conserving soil moisture, root structure and development and growth of farm crops. Mr. Edgerton. Lectures and laboratory.

COURSE IV.—*Farm Drainage,* second term, Sophomore Year, includes practical effects of drainage, land needing drainage, preliminary and topographical survey, involving the different problems of drainage, engineering, map draw-

ing, calculating depth of drains and capacity of pipes, laying the drains and preserving them intact. Mr. Atkinson. Lectures and field work.

COURSE V., First term, and COURSE VI, second term, *Field Crops and Farm Management*, includes the planting, cultivation and management of crops, rotation, maintenance of soil fertility, plant growth and nutrition, management and application of manures, harvesting, stacking, plowing, preserving fodders, and pasture and field observations. Mr. Atkinson.

DEPARTMENT OF DAIRYING.

CHARLES F. CURTISS AND GEO. L. MCKAY, PROFESSORS.

C. H. ECKLES AND ED. H. WEBSTER, ASSISTANTS.

The magnitude and rapidly changing conditions of the dairy industry render a higher degree of skill and intelligence in this field imperative. No branch of industrial education has proven more popular or productive of better results than the instruction furnished in the economical production of a superior class of dairy products. From the fertile farming lands of the Central West annually come one hundred or more young men to be trained in special work at our dairy school. That these young men become leaders wherever they take up work, is shown by the responsible positions they are holding at high salaries in dairy communities everywhere, and the many prizes won in state and national conventions. Even the city milk supply business is calling for scientifically trained men who thoroughly understand the essential regulations for proper sanitation and cleanliness, pasteurization and sterilization.

In order to meet the demands of such instruction, the Dairy School provides a four-weeks course for butter makers and cheese makers, beginning the second week in January, two sixteen weeks courses beginning with the regular college terms and a one year course beginning

with the college year. The first is only for practical and experienced butter and cheese makers, the other courses are open to all.

The College Creamery is in operation the year round. The work is conducted on a practical and commercial scale as well as for scientific investigation and instruction. The daily milk receipts have reached 25,000 pounds, and the product made invariably brings the highest quotations, and has attained an enviable reputation in the markets of the United States and England.

The facilities for teaching dairying in a thoroughly practical and scientific manner are unexcelled. The dairy charge of good plants will be admitted. Buttermakers of building is exceptionally well equipped for practical work as well as scientific instruction and investigation. It is more than a "dairy building" as the term is generally understood. It is a practical working creamery and cheese factory, in operation every week day in the year. During the summer season from fifteen to twenty-five thousand pounds of milk are taken in daily and manufactured into butter and cheese; during the winter somewhat less. The milk is purchased from farmers living in the vicinity of the College, and they are paid for it according to its merits based not only on butter fat determined by the Babcock test, but upon inspection of its cleanliness, freedom from all taints, objectionable odors, and other general qualities. A bacteriological laboratory affords facilities for instruction and investigation in this important feature of the subject.

The student becomes familiar with everything connected with the management of a commercial creamery, and meets every problem that is likely to confront him in his after work. Five different kinds of separators are used in the dairy building and the most approved machinery is used throughout.

The work done in dairying by the students of the four year course in Agriculture is outlined in the course of study. They not only become familiar with the work in the creamery, the cheese factory and the private dairy, but study the underlying principles of the entire subject in the

broadest sense. The College dairy herd, consisting of thirty or forty cows regularly in milk affords opportunity for the study of dairy as well as creamery problems. These cows are milked and cared for mainly by student help under the direction of instructors.

During the latter part of the senior year those students who have shown themselves capable, are permitted to spend a portion of their time in the laboratory in original work, and meritorious work of this kind is reported in the bulletins of the Experiment Station.

The courses in dairying were established for the benefit of those who are already engaged in the business, either on the farm or in the creamery or factory, and for this reason a very large portion of the time is devoted to practical work in the dairy building.

Students in these courses are taught everything connected with practical work, from weighing the milk brought in by the different patrons and testing the same, to running the engine, scrubbing the floors and shipping the butter. The aim is to teach not only how to do all the work incident to a business of this kind, but also why—the reason—the work should be done in the manner taught. The studies other than dairying proper which appear in the courses outlined are such as are necessary to a correct understanding of the principles involved, and all students entering these courses are required to attend them regularly.

Students in all of the Dairy and Creamery work are required to provide themselves with white suits, keep them clean and in good order. One-half of the expense of laundering creamery suits will be refunded at the end of each term to all students who have passed a satisfactory inspection in work and cleanliness during the term.

THE ONE-YEAR COURSE IN DAIRYING.

The One Year Course in Dairying is designed to meet the wants of those who wish to acquire an intimate knowledge of practical dairy methods and the underlying

principles as well as to the sciences related thereto. This course runs through one College year, beginning in September and ending in June. Students completing this course will receive certificates, but the right is reserved to withhold such certificates until satisfactory evidence is furnished of ability to successfully manage commercial creameries or other large dairy establishments. No other certificate will be given for any course in Dairying, except to students entitled to a diploma for the four-year-course in Agriculture.

Following is the course of study pursued:

FIRST TERM.

Dairy Practice, 6 days per week.—(Dairy I)
Milk and Its Product, 16 Lectures.—(Dairy II)
Milk Testing, 20 Lectures.—(Dairy III)
Bookkeeping, 16 lectures.—(Dairy V)
Bacteriology of Milk, 20 Lectures.—(Dairy VI)
Judging Dairy Stock, 16 Lectures.—(Dairy VII)

SECOND TERM.

Dairy Practice, 6 days per week.—(Dairy I)
Cheesemaking, 16 Lectures.—(Dairy VIII)
Pasteurization, 16 Lectures, and Laboratory work.—(Dairy IX)
Dairy Machinery, 10 Lectures.—(Dairy IV)
Feeding Dairy Stock, 20 Lectures.—(Dairy X)
Dairy Chemistry, 16 Lectures.—(Dairy XI)

THE SUMMER SCHOOLS IN DAIRYING.

While we earnestly advise those who expect to work in dairy lines, either on the farm or in the creamery or factory, to take the one-year course in Dairying as outlined above, we realize that there are many who for various reasons are unable to do this. Believing that a State institution should offer every possible encouragement to

those who desire to fit themselves to do their chosen work in the best manner, two Summer Schools in Dairying are thrown open to students. The first of these schools begins with the regular College year in September and continues sixteen weeks. The second begins with the second regular College term in February and continues sixteen weeks. The same studies are pursued during these terms and are as follows:

Dairy Practice, six half days per week.—(Dairy I)
Bacteriology of Milk, 20 Lectures per term.—(Dairy VI)
Bookkeeping, 16 Lectures per term.—(Dairy V)
Dairy Machinery, 10 lectures per term.—(Dairy IV)
Milk Testing, 20 lectures.—(Dairy III)
Milk and Its Products, 16 lectures.—(Dairy II)
Judging Dairy Stock, 16 Lectures, or Feeding Dairy Stock, 20 Lectures.—(Dairy VII, X)

THE WINTER SCHOOL IN DAIRYING.

This school is conducted for the benefit of those who wish to make a special study of Dairying and the sciences closely related thereto, and who are not able to attend during the longer sessions. It begins the second week in January and continues four weeks. It is largely attended by men who have had practical experience in dairy work, but feel the need of a more thorough knowledge of the principles which underlie the science of Dairying and the most improved methods, and it is desired that the attendance be limited to this class. Young men who have had no previous experience in creamery or dairy work are required to take the summer course or the one-year course in Dairying.

Being held during the winter, a great many men who have charge of creameries and cheese factories during the summer are able to attend, and those who have done so have expressed themselves as being greatly benefited thereby.

On account of the limited time in this course it is not expected that students will take both butter and cheese-

making. Those who wish buttermaking will take all the lectures except those on cheesemaking, and will do all their practical work in the butter room. Those who take cheesemaking will attend all lectures except those on buttermaking, and will do their practical work in the cheese room.

The course of study outlined is as follows:

Work in Dairy Building 6 half days per week.—(Dairy I)
Buttermaking, 10 Lectures.—(Dairy II). *or*
Cheesemaking, 10 Lectures.—(Dairy VIII)
Dairy Chemistry, 10 Lectures.—(Dairy XI)
Bacteriology of Milk, 15 Lectures.—(Dairy VI)
Bookkeeping, 10 Lectures.—(Dairy V)
Milk Testing, 10 Lectures.—(Dairy III)
Dairy Machinery, 10 Lectures.—(Dairy IV)
Scoring Butter and Cheese, 5 lectures.—(Dairy XII)
Feeding Dairy Stock, 10 Lectures.—(Dairy X)

INSTRUCTION IN THE USE OF BUTTER STARTERS AND FLAVORS AND THE ACID TEST.

The prominent rank attained by students of the Iowa Dairy School in state and national contests has led to a demand for special instruction in the use of starters and flavors and the use of the acid test in buttermaking. This course will begin January 2, 1902, and continue ten days. No one but experienced buttermakers who have had entire less experience are advised to take the regular short course in Dairying beginning January 13, 9102. The fees for the course in starters and flavors and the acid test will be $20 per term.

The scope of the work given in the Department of Dairying is set forth clearly in the following statements:

Course I.—*Dairy Practice.*—This includes from five to seven hours of practical work in the Creamery room during the first term of the One-Year's Course, the two Summer Courses and the Winter Course. This includes buttermaking with Mr. Webster and laboratory work in milk

testing with Mr. Eckles. In the second term of the Year Course it includes cheesemaking with Professor McKay and pasteurization with Mr. Eckles.

COURSE II.—*Milk and Its Products.*—This includes instruction in the composition of milk and dairy products, the theory of centrifugal separation and the construction of the various kinds of separators. Special attention is given to the effect of varying conditions of the milk on separation. It includes a consideration of the principles of cream ripening, churning, and the preparation of the butter for market. Mr. Webster.

COURSE III.—*Milk Testing.*—This includes a thorough study of the Babcock Test for dairy products with special instructions for overcoming the difficulties from varying conditions. The tests for determining acidity of cream and milk and the use of the lactometer for detecting adulterations are included, also composite sampling and testing of individual cows. Mr. Eckles.

COURSE IV.—*Dairy Machinery.*—(Mechanical Engineering, XL)—This embraces instruction for firing boilers by the most economical methods, the construction and operation of engines and pumps, and the placing of machinery and shafting. Mr. Lennox.

COURSE V.—*Bookkeeping.*—This course is designed to inform the student as to the best system of bookkeeping for the business of the factory.

COURSE VI.—*Bacteriology of Milk.*—This course consists of lectures on the nature of bacteria, distribution and the conditions necessary for their growth. The effects produced by various bacteria commonly found in milk are shown by lectures and demonstrations. The methods of handling which cause contamination of milk are considered in detail. That the quality of dairy products depends mostly upon the fermentations which have taken place in these preparations is shown with detailed attention to the use and value of starters in butter and cheesemaking. The principles of cream ripening and pasteurization are also included. Mr. Eckles.

COURSE VII.—*Judging Dairy Stock.*—In this course the judging of dairy stock with the score card and by comparison is made a leading feature, while the lectures relate mostly to the principles, methods and practice of breeding dairy stock and their management. Professor John A. Craig and Mr. Marshall.

COURSE VIII.—*Cheese Making.*—In the winter term, this consists of ten lectures on Chedder cheese, including a study of the kind of cheese demanded by different markets, etc. In the second term of the One Year Course the same work is taken up as during the winter term, but with the addition of six lectures on fancy brands of cheese, including Limburger, Brick, Swiss, Roquefort, Sage, Stilton, Pine Apple and Gouda. Professor McKay.

COURSE IX.—*Pasteurization.*—Second Term, One Year Course in Dairying. The subjects treated in this course are the relation of the milk supply to the public health, the principles of pasteurization and apparatus adapted for various purposes, with the practical operation of the more common machines. The production and the sale of "Sanitary" milk is taken up together with a general consideration of the market milk business, the use of preservatives and allied topics. Mr. Eckles.

COURSE X.—*Feeding Dairy Stock.*—Second term, One Year Course in Dairying and Winter Course. Special attention is given in this course to the principles of feeding animals for the most economical production, with a study of the composition and use of various feeding materials, and the feeding of dairy cows, including the influence of various feeding stuffs on the quantity, quality and composition of milk, butter and cheese. Mr. Marshall.

COURSE XI.—*Dairy Chemistry.*—(Ag. Chemistry, V or VI). The chemical composition of dairy products is considered in a general manner. The alkali test both in theory and practice is given in order that it may be used by the student. The adulteration of butter, cheese and milk as it relates to the dairy industry is also taken up in the lectures. As a whole, the work is intended to furnish a

foundation for the student, which he can use as a basis for future study. Professor Weems.

COURSE XII.—*Scoring Butter and Cheese.*—These lectures are designed to give the student a correct idea of the standard market requirements for dairy products. Butter and cheese are examined and scored by the students and their judgments compared with that of the instructor, Professor G. L. McKay.

COURSE XIII.—*Farm Dairying.*—This is a required study first term Junior year. Optional study in course for women. Two recitations and two laboratories per week. The class work takes up composition and secretion of milk, separation of cream by gravity and centrifugal separators, the Babcock test for fat, ripening cream, churning and packing butter. The second half of the term is given to lectures on the Bacteriology of milk with reference to the general applications of the subject, such as contamination of milk and its prevention, effect of bacteria or food value of milk, relation of bacterial changes to butter and cheese, etc. The laboratory work may be done in the creamery proper or in the farm dairying room, as desired. In the latter, the apparatus and work is arranged and the butter made as it is in the best modern private dairies. The student uses the Babcock Test, the lactometer and churns, butterworkers and separators of various design. Mr. Eckles, Mr. Webster.

COURSE XIV.—*Farm Dairying.*—Second term, Junior Year. Two laboratories and one recitation per week in cheesemaking. For class work see Dairy VIII. Laboratory work in making cheese under conditions of a good private dairy. Also practice in making factory cheese if desired. Professor McKay.

COURSE XV.—This course includes one laboratory and one lecture per week. The various types of milk fermentation are taken up and studied in the laboratory. Practical experiments are made in regard to the contamination of milk and its prevention. The application of the principles of bacteriology to butter and cheese making are studied

and the use and importance of starters shown by experiment. Mr. Eckles.

COURSE XVI.—This course is arranged by the instructors to suit the needs of the students. It is mostly laboratory work with assigned topics in standard dairy books. Mr. Eckles.

COURSE XVII.—This course includes laboratory and experimental work in the butter and cheese rooms and in the Dairy Bacteriology laboratory. The work is arranged by the instructors as seems best suited for the training the students desire. Mr. Eckles.

DEPARTMENT OF ANIMAL HUSBANDRY.

CHARLES F. CURTISS AND JOHN A. CRAIG, PROFESSORS.

F. R. MARSHALL, ASSISTANT.

As the importance of the live stock industry to the welfare of the state has long been recognized, the equipment for instruction work has now become very complete. The herds and flocks were established at an early day on a good foundation and having been maintained in conformance with modern ideas, the number and quality of the stock offer the students unusual facilities for becoming informed along these lines.

The horse department includes representatives of the leading draft and light horses. Among these are Shires, Clydesdales, and Percherons, some of them directly imported by the College, and others obtained from the leading studs of our country. The breeds of light horses include the French coach, trotting and gaited saddle bred representatives. These are always available for the study of the students, either in the class room or when actively engaged in the ordinary work of the farm.

The cattle department numbers over a hundred head, representing the leading beef and dairy breeds. Complete herds of Short Horns, Aberdeen Angus, Red Polled, Jersey and Holstein cattle are maintained. Most of these herds

have been in course of formation for a great many years so that it is possible for the students to study not only the types of the different breeds, but they are also able to form conclusions as to the results that may be obtained from them under the farm conditions of Iowa.

The equipment of the sheep department is equally strong, as there are six breeds fittingly represented, including Cotswolds, Shropshires, Oxfords, Southdowns, Dorsets, and Merinos. These have been carefully chosen to represent the type and characteristics of each breed, both in regard to their mutton and wool bearing qualities.

In the swine department, representatives of six breeds are maintained, including the best American as well as the leading British varieties. As in the other departments, the aim in this has been to keep in touch with the modern ideas of the leading breeders, both in regard to breeding and type of the animals in these breeds. At all seasons of the year there is more or less feeding of market stock being done on the farm and in connection with the Experiment Station, so that excellent material is always available for instruction purposes regarding the qualities that add to the value of stock for the ordinary market. Having pure bred representatives in addition, it is easy to inform the student in a practical way on the finer points of color, type, and other characteristics that relate to the pure bred classes of stock.

To further assist in this work, the herd books of the different American and foreign registry associations are being constantly added to the library. Through these the student is not only enabled to inform himself in regard to pedigrees, but he is also enabled through them to study the different scales of points which the breeders have adopted as representing the highest type of the breeds. Other features of the equipment include photographs and charts utilized in the lecture room where it is not possible to make suitable representation with the living animals. It is the aim of the department to illustrate all lines of instruction with living representatives, and for that purpose a live stock room has been specially fitted. In addition a

large pavillion has been constructed specially designed for the uses of the classes in live stock judging. The abundant material available from the herds and flocks is freely drawn upon and used extensively in all lectures and score card practice. By means of score cards prepared by the department, the students are brought in close contact with the animals and through them are informed on the points of market merit desirable in ordinary stock; while later the use of the official scale of points for the different breeds in a similar way, makes them skillful in judging representatives of the different breeds.

As soon as the student shows that he possesses the qualifications needed to successfully judge stock in the show ring, he is sent out in answer to the many requests from the secretaries to judge various classes of stock at county fairs. This in connection with his college work results in crystalizing the lessons learned in the class room.

WINTER COURSE IN STOCK AND GRAIN JUDGING.

In response to a widespread demand for special short course instruction in judging stock and grain, a two week's course has been established during the winter vacation. This course will begin January 6th, 1902, and continue two weeks and will be devoted exclusively to instruction in judging and score card practice with horses, cattle, sheep and hogs, and in addition, the study of grains will be taken up during the evening. This work will be principally with corn and will consist in lectures and instruction with the score card. Some time will also be given to the study of wheat, oats and barley. The regular instructors of the college will be assisted in this work by some of the best known expert stock and grain judges of America. To partially cover the expense of securing additional help, a tuition fee of $1.00 will be charged for admission to this course.

The following courses of study are given in Animal Husbandry:

COURSE I.—*Live Stock.*—First Term. Freshman Year. This course covers the judging of the different market classes of horses and sheep by the score card, and also includes the scoring of pure bred representatives according to the official scale of points adopted by the different breed associations. It includes also the history, characteristics and utility of the breeds of horses and sheep and special attention is further given to the management and care necessary to produce the highest types of these. The study of pedigrees, their tabulation and the understanding of them is made a feature of this course and embraces an inquiry into the foundation of the families of the different breeds of horses and sheep. The student is made familiar with the records and methods of recording and transferring the different classes of pure bred stock. Professor John A. Craig and Mr. Marshall.

COURSE II.—*Live Stock.*—Second Term. Freshman Year. This course includes score card practice in judging cattle and swine for market and also scoring pure bred representatives of these breeds with the official scale of points. The history and characteristics and the utility of the different breeds of cattle and swine are discussed and the practices that enter into the management of these are presented in detail. The tabulation of pedigrees of cattle and swine is studied during this course so that the student may be able to pronounce upon the completeness, the reliability and the merit of any pedigree of any of the classes of stock studied. The details of recording, and transferring pure bred stock is also fully investigated in their relation to cattle and swine. Professor John A. Craig and Mr. Marshall.

COURSE III.—*Principles of Heredity.*—First Term. Junior Year. This course embraces a study of the principles of breeding, including selection, heredity, atavism, variation, fecundity, with a presentation of the methods of breeding, in-and-in breeding, cross breeding, etc., and a historical study of their results. In addition, the several features relating to the higher breeding of pure bred stock are

made the subject of study and investigation. Professor Curtiss.

COURSE IV.—*Feeds and Feedings.*—Second Term. Senior Year. This course includes anatomy and physiology of the digestive system, the purposes of nutrition, theory and practical economy of rations for growth, fattening, milk, or maintenance; sanitation of feeds and hygiene of the farm. Professor Curtiss.

COURSE V.—*Live Stock.*—First Term. Senior Year. The main features of this course are the scoring of representatives of the different breeds and judging classes of different ages similar to those of the show ring. The aim of this course is to make the student proficient in show ring judging so that he may be able to undertake this work in a practical way. To this end rings are made of different ages of stock and also of breed representatives; thus giving the student practice in recording his judgment and explaining his reasons for the positions that are given the animals. The work of the first term includes the work of judging horses and sheep in this manner. Professor John A. Craig.

COURSE VI.—*Live Stock.*—Second Term. Senior Year. This course is similar to that of previous course excepting that studies are confined to cattle and hogs. Classes are made up with five or six animals in the ring similar to those of state fairs and the student is trained in judging classes of different ages and also of different breeds with a view to making him proficient in show ring judging. Professor John A. Craig.

DEPARTMENT OF HORTICULTURE AND FORESTRY.

HOMER C. PRICE, PROFESSOR.

ARTHUR T. ERWIN AND EDWIN E. LITTLE, ASSISTANTS.

The studies in Horticulture and Forestry are designed to round up and fill out the Course in Agriculture. A graduate in agriculture is expected to have such knowledge

of the principles of horticulture as will assist him either in beautifying and adding to the luxuries of his home on the one hand, or on the other, such as will guide him rightly should he engage in commercial fruit growing.

Fruit growing is rapidly becoming a specialized industry and success rewards the laborer in proportion as intelligent skill and perseverance are applied to the work with a thorough understanding of the principles.

FACILITIES FOR STUDY AND DEPARTMENTAL EQUIPMENT.

The department of Horticulture occupies a part of the second floor of Agricultural Hall. A commodious, well-lighted class room is adjacent to the office and library. The library is composed largely of books presented to the department by the late Charles Downing, author of "Fruit and Fruit Trees of America." This library is accessible to senior students and those taking graduate work. The greenhouses consist of a palm house 24 feet wide by 33 feet long with a curvilinear roof; an even span house for growing of decorative stock, 19 by 33 feet, three even span houses for forcing of vegetables, each 33 feet long by 10 feet wide. These houses furnish admirable opportunities for students to become familiar with the principles of propogation under glass and the general management of greenhouses and the forcing of vegetables. The land devoted to Horticultural purposes comprises about forty acres. In this area are orchards of varying ages from twenty-five years down to those set within the last two years. The varieties of fruits on trial number more than one thousand and include the hardiest types of native and foreign kinds. The student is thus afforded unusual facilities for observation and study. Adjacent to the orchards and small fruit plantations are the nursery grounds where the operations of the nurserymen in the various methods of stratification, budding and grafting are illustrated in a practical manner. A considerable area is devoted each

year to the growing of vegetables and variety tests of the leading types are made in connection with the Experiment Station work, thus affording ample opportunity for field study in the methods of culture practiced by the amateur and market gardener.

There is a forest plantation of about ten acres in which are growing a large number of the best varieties of deciduous trees for the northwest. A large collection of prepared sections of the American woods is used for illustrating the lectures on forestry. The campus and shelter belts surrounding the College give ample opportunity for a study of the comparative value of native and foreign trees when used for windbreaks and landscape effect. Horticulture in all its branches is continued from the second term freshman year to the close of the senior year. Special encouragement is offered to senior students who wish to pursue some line of original investigation. The graduate who elects the Horticulture Group in his senior year will find himself well equipped to pursue post graduate studies at this or other institutions of like character. Text books are used in each course when it is possible to do so advantageously. Lectures are given when it is necessary to enlarge or supplement the text. The following courses of study are offered by this department:

COURSE I.—*Elementary Horticulture.*—This course is a study of the underlying principles of plant growth as effected by moisture, light, temperature and food supply. The student begins with the plant life in the seed and follows it through its numerous stages of growth to the mature plant. The multiplication of plants by seedage, cuttage, layerage and graftage are studied in connection with practical laboratory work along these lines. This course is a pre-requisite to all other courses in Horticulture except course No. XI. Two recitations and one laboratory period a week. Spring term, Freshman. Professor Price and Mr. Erwin.

COURSE II.—*Forestry.*—This includes a study of forestry influences upon climate, rain-fall and erosion. A study

is also made of the best varieties of trees for shelter-belts and wind-breaks in the northwest. Two hours per week. Spring term Sophomore. Professor Price.

COURSE III.—*Greenhouse Management.*—This course embraces, a historical sketch of the evolution of green house structures, and a discussion of the principles of forcing flowers and vegetables in the greenhouse and hot-bed. One recitation and one laboratory per week. Fall term, Senior. Mr. Erwin.

COURSE IV.—*Pomology.*—Under this head the principles which underly successful orcharding in the northwest are studied; and the history and characteristics of the leading varieties of the orchard fruits are studied. Score card practice is given in judging apples, plums, pears and grapes. Three hours per week. Fall term, Junior. Professor Price, and Mr. Little.

COURSE V.—*Olericulture.*—This comprises a study of vegetables and small fruits of the garden from the standpoint of the amateur and the market gardener. Two hours per week. Fall term, Sophomore. Mr. Erwin.

COURSE VI.—*Field Work.*—This course is designed to give the student a personal touch and acquaintance with the practical details of orchard management. Pruning, spraying and plant breeding are studied theoretically and practically. One lecture and a field exercise of two hours per week. Spring term, Junior. Mr. Erwin, and Mr. Little.

COURSE VII.—*Evolution of Cultivated Plants.*—Under this head stress is laid upon the improvement and development of our native plants. A study is made of the amelioration and development of American fruits. One hour, Spring term, Senior. Professor Price.

COURSE VIII.—*Landscape Gardening.*—Lectures on landscape gardening as an art; artificial and natural methods are compared, and the embellishment of home surroundings; lawn-making and shrubs suitable for the climate and

soil of Iowa are studied. Two hours. Fall term, Senior. Professor Price.

COURSE IX.—*Literature of Horticulture.*—A study of European and American Horticultural Literature. A historical study is made of the lives, works and writings of the pioneers in the various branches of Horticulture. One hour. Spring term, Senior. Professor Price.

COURSE X.—*Research.*—Offered to students who have elected work in Group D. A special line of investigation will be mapped out, which the student is expected to pursue independently. Two hours. Spring term, senior. Professor Price.

COURSE XI.—*Amateur Floriculture.*—The study of window gardening, seed sowing, propogation and general management of house plants; the out door flower garden and treatment of flower beds and borders. Lectures and recitations two hours per week. This is an elective in women's course only. Fall term. Junior. Mr. Erwin.

Students electing course X are allowed to use it as a basis of preliminary work in the preparation of theses.

Post-Graduate work is offered in the leading advanced courses outlined above.

DEPARTMENT OF AGRICULTURAL CHEMISTRY.

JULIUS BUEL WEEMS, PROFESSOR.

C. E. ELLIS, ASSISTANT.

The Department of Agricultural Chemistry is connected with the chemical section of the Experiment Station, both occupying a large part of the first floor of Agricultural Hall. The department and the section have separate laboratories, each equipped for its special work, the first for student work and the second for research and general analytical chemistry.

The advantages of this combination can be readily seen, as it affords the student many opportunities to become familiar with the practical side of Agricultural

Chemistry, and at the same time illustrating to him the value of the laboratory processes which he carries through as part of his course of study when applied to the study of the problems of modern agriculture.

The student on commencing the course of study is provided with a separate desk in the laboratory, and is furnished with a supply of chemical apparatus and chemicals for his individual use. The desk is supplied with water and gas, and cupboards and drawers are provided with locks enabling the student to have full control over the chemical apparatus in his possession.

The laboratory is well supplied with hoods and the balance room contains six Sartoris balances. Each student is assigned to a balance and is expected to use this balance only in his work.

Throughout the entire course of Agricultural Chemistry special stress is laid upon the study of the elements and compounds which are valuable to the agriculturist, and very little attention is given to the study of the rare or uncommon elements. The student records the observations made in the laboratory in a notebook kept for this purpose, and at the close of each term the instructor marks it as part of the student's work; considering the care with which the results of the laboratory experiments are recorded, the penmanship and the English used in describing the experiments made by the student. The mark given on the condition of the notebook is considered in the final mark that determines the student's standing in the study for the term.

The following courses of study are offered by the department:

COURSE I.—*Elementary Agricultural Chemistry.*—This course of study requires three recitations and two afternoons of laboratory practice each week for one term. The course is arranged for those commencing the study of Agricultural Chemistry and is therefore of an elementary character. The student begins the study by making observations on a few substances and becoming familiar with the processes connected with the science. As the

student progresses in his work the study becomes more and more complex, until he reaches qualitative analysis, in which, after a general introduction to the reactions of a number of elements, he tests a series of unknown solutions in order that he may obtain as much practice as possible in this part of the study.

The laboratory work is supplemented by oral examinations in the class room. The above course of study is given in the second term.

The text book used is Remsen's Inorganic Chemistry, Briefer Course.

COURSE II.—*General Chemistry in Its Relations to Agriculture.*—This course of study is practically a selection of laboratory exercises which are of value to the student in agriculture. It is given during the second term and requires two recitations with two afternoons of three hours each for laboratory practice every week during the term.

The recitations are upon organic chemistry, and the laboratory practice consists in estimating the amount of various elements present in substances which are important to agriculture. The substances first submitted to the student for examination are pure salts and are soon followed by complex mixtures similar to those met with in practical work. The entire series of determinations made by the student are upon substances, the knowledge of which will be of value to him in the practical field of agriculture. The laboratory practice is supplemented by lectures and oral examinations as often as thought necessary by the instructor.

The text book used is "Remsen's Organic Chemistry," which is supplemented by lectures and notes for the laboratory practice.

COURSE III.—*Advanced Chemistry as Related to Agriculture.*—This course of study is given during the first term and requires two recitations or lectures and two afternoons of three hours each of laboratory practice each week for one term. The class work consists of a study of soils and their relation to plant growth, the ash of the plant and the influence of fertilizers in plant growth, etc. The student

undertakes in the laboratory preparation of a number of standard solutions in volumetric analysis and special attention is placed on the preparation of the solutions required for use of the "Mann's" or "alkali" test in the determination of the acidity of milk and cream.

The student also becomes familiar with the polariscope and its uses. In connection with this part of his course he makes complete analyses of sugar beets, samples of which are submitted to him for this purpose.

If time permits the examination of water for sanitary purposes is undertaken, and which may be extended to the examination of the mineral constituents of water should the student desire to do so.

COURSE IV.—*Special Organic Chemistry Related to Agriculture.*—This course is given in the first term, requiring two recitations or lectures and two afternoons of three hours in laboratory practice each week during the term. The laboratory practice consists of chemical examinations of milk, butter, cheese and other agricultural products. In the course of lectures the following, among other subjects, are considered: The chemistry of digestion; food and its adulteration; ptomaines, their formation and action on the animal body, and advanced chemistry of the plant.

Special notes are used for the laboratory practice.

COUESE V.—*Elementary Dairy Chemistry.*—This course is a short course of lectures offered to the students in the winter dairy school, and is limited to the consideration of a few subjects of a practical nature.

COURSE VI.—*Dairy Chemistry.*—This is a course of lectures offered to the one-year dairy students and the subject is considered to a greater extent in this course than in the elementary course.

COUESE VII.—*Additional Agricultural Chemistry.*—This course of study is offered to students who may desire to take additional work in Agricultural Chemistry in the senior year, and it consists in a special course in laboratory practice and a selected course in reading, which is related to the laboratory work. The entire course is made to meet the desire of the student in any special line of work.

COURSE VIII.—*Thesis.*—Those who may desire to specialize in Agricultural Chemistry during the undergraduate course can select a thesis on some chemical subject. The scope of the work will be as far as possible of the nature of an investigation on some topic which is of interest to the student.

Courses I, II, III and IV are required of all students in Agriculture. Course I is taken in the Sophomore Year. Courses II and III are taken in the Junior Year, and course IV in the Senior Year.

The material required in the laboratory courses is furnished by the department at cost. To cover the cost of material and breakage, a deposit of $5.00 is required for each of the courses I, II, III, IV, VII and VIII. The deposit must be made before the student begins work in the laboratory, and balances from these deposits are returned at the end of each term.

In addition to the above courses of study offered by the department, graduate students are offered courses in Agricultural Chemistry which may be taken as a minor or major study in their graduate course. These courses are arranged to meet, as far as possible, the individual desires of the students.

The courses offered by the Department for Graduate Students are as follows:

COURSE IX.—*Minor in Inorganic Agricultural Chemistry.*

COURSE X.—*Minor in Organic Agricultural Chemistry.*

COURSE XI.—*Major in Inorganic Agricultural Chemistry.*

COURSE XII.—*Major in Organic Agricultural Chemistry.*

The nature of the work for both major and minor studies will be that of an investigation in some subject to be selected by the student and the head of the department.

COURSE XIII.—*Elementary Mineral Chemistry.*—This course is intended for those interested in the study of Chemistry in its relation to Ceramics. It is restricted to the elementary study of those elements and compounds which are found valuable in the study of Geology. The

course requires two recitations and three laboratories each week of the term.

Special notes will be used for recitations and laboratory practice.

COURSE XIV.—*Mineral and Geological Chemistry.*—The course of study is given during the second term and requires two recitations and three afternoons of laboratory practice. The laboratory practice will consist of the estimation of various substances found in the material of value to the clay industries. The recitations in the class-room will be closely connected with the laboratory work and related subjects.

Special notes will be used for the class-room and the laboratory.

COURSE XV.—*Chemistry of Clays.*—This course of study is given during the first term and requires two recitations and three afternoons of laboratory practice each week. The work of this term is intended to offer the student every opportunity to apply in practical laboratory work the results of study in courses XIII and XIV. The laboratory practice will be practical work upon clays. Both rational and complete chemical analysis of clays will be made by the student. Analysis of samples of lime stone and other products will supplement the work on clays. The recitations will be closely related to the laboratory work.

Special notes will be used for the course.

COURSE XVI.—*Chemistry of Clays and Glazes.*—This course of study will be given in the second term and will require two recitations and three afternoons of laboratory practice.

The laboratory practice will consist of practical work on products connected with the clay industries, analysis of water for boiler and other purposes, and analysis of paints, coal and similar products.

The recitations will supplement the laboratory work and will also consider chemistry in its relation to the ceramic industry.

Special notes will be used for recitation and laboratory practice.

COURSE XVII.—*General Technical Chemistry.*—This course is designed for those who have had a training in elementary chemistry and desire to specialize in technical chemistry. The course of study will consist of three lectures or recitations per week and two afternoons of laboratory practice. The lectures and class room recitations will be largely on advanced inorganic chemistry in its relation to the technical industries. The laboratory practice will consist in the quantitative analysis of those substances of value to the industrial processes connected with manufacturing.

This course of study is offered in the first term.

COURSE XVIII.—*Advanced Technical Chemistry.*—This course of study is a continuation of the course in General Technical Chemistry and will consist in the analysis of Clays, Glazes, Fertilizers, Pigments, water for boiler purposes, etc.

Three recitations or lectures and two afternoons of laboratory practice each week will be required for this course of study.

The recitations and lectures will supplement the laboratory practice.

Special notes will be used in the course.

COURSE XIX.—*General Organic Chemistry in Its Relation to Engineering.*—It is the purpose of this course of study to offer the student studies in the Sanitary Analysis of Water, Analysis of Sewage, Foods, their composition and analysis. The manufacture of food products and their analysis, such as the cereal products, sugars, starch, etc. The lectures and recitations after an introductory course in organic chemistry will be largely upon the chemistry of water, its analysis, its filtration, and purification for city supplies, the value of foods and methods of detection of adulteration and the methods of preservation, the manufacture and composition of explosives, paper, and fibers in their application to the industries. The study of sub-

stances used for disinfectants will also be considered in the course of lectures.

Special notes will be used for recitation and laboratory practice. This course of study requires four recitations and three afternoons of laboratory practice. Remsen's Organic Chemistry will be used with special notes for recitation and laboratory practice.

COURSE XX.—*Industrial Organic Chemistry in Its Relation to Engineering.*—This course of study will consist in lectures, recitations and laboratory practice on oils, their composition and detection of adulterations, considering both lubricating and drying oils for painting purposes, fuels, their composition and heating values; fats, their

The horse department includes representatives of the leading draft and light breeds. Among these are Shires, composition and applications, etc.

In the class room the manufacturing processes used in connection with the products studied in the laboratory will be considered. Attention will also be given to the relation between the study of chemistry and its application to industrial purposes in general.

Students taking course IX to XX make a deposit of $8.00 to cover cost of breakage, chemicals and gas used in their laboratory work.

EXAMINATION FOR SOUNDNESS.

COURSE LX.—*Veterinary Science.*—In this course, which is given in the first term of the Senior year, the student is taught how to make a systematic search for disease or pathological conditions, the various conditions likely to be found in each part and the effect they may have on the use of the animal. Two lectures are given each week, supplemented by demonstrations on the living animal. Dr. Stalker.

SANITARY SCIENCE.

COURSE LIX.—*Veterinary Science.*—Two lectures are given each week in the first term of the Senior year. The

following topics are discussed: The great plagues of history and their sanitary lessons; the various causes of disease; the manner in which disease is propogated and spread, including the part played by meat and milk; the influence of soil, configuration and climatic conditions, the effect of environment, including the ventilation, lighting and drainage of stables; preventative measures, including disinfection, vaccination and quarantine.

COURSE LXXI.—In the second term of the Senior year the various infectious, contagious and parasitic diseases are separately considered and the methods of preventing their introduction and suppressing outbreaks are discussed, two lectures being given each week. Dr. Klein.

PRINCIPLES OF HORSE-SHOEING.

COURSE XLI.—*Veterinary Science.*—In the first term of the Junior year one hour each week is devoted to the study of the anatomy and physiology of the hoof, the relation between the form of the hoof and the direction of the limb, the variations in the flight of the hoof the shoeing of normal and irregular hoofs, winter shoeing and hoof culture.

COURSE LI.—*Veterinary Science.*—In the second term of the Junior year the correction of defects in gait and the methods of shoeing hoofs defective in form or diseased are taken up, one hour each week being devoted to the subject.

"A Text Book on Horse-Shoeing," by Lungwitz, tranlated by Adams, is used in these courses. Dr. Klein.

COMPARATIVE PHYSIOLOGY.

COURSE XVII.—*Veterinary Science.*—The physical and chemical laws, as they are related to physiology, and the general properties of animal cells, their origin, development and growth are studied in the first term of the Freshman year, one hour each week.

COURSE XXXII.—*Veterinary Science.*—This course is given in the second term of the Freshman year, one hour

each week, and is a continuation of Course XVII. Both of these courses are introductory to Course XXXVIII and Course XLVIII.

"A Manual of Veterinary Physiology," by F. Smith, is used in these courses. Dr. Klein.

OBSTETRICS.

COURSE LXX.—*Veterinary Science.*—This course includes a review of obstetrical anatomy, reproduction, hygiene of pregnant animals, pathology of gestation, normal parturition, dystokia, obstetric operations, accidents of parturition, pathology of parturition, diseases of the young animal. The students are instructed in the use of the various instruments and appliances used in obstetrical practice. Dr. Repp.

MATERIA MEDICA.

COURSE XXIX—*Veterinary Science.*—This course in Materia Medica includes a discussion of all the preparations used in veterinary therapeutics. The drugs and preparations discussed in the lectures are exhibited to the students who are required to become intimately acquainted with their leading properties. In case of each drug attention is called to the following features or such part of them as the character of the drug demands: Botanical name, natural order, habitat, description of properties, method of preparation, adulterations, names of therapeutic actions, preparations official in the United States Pharmacopoeia. Dr. Repp.

COURSE XXXIII.—*Veterinary Science.*—This is a continuation of the work described in Course XXIX. Dr. Repp.

COMPARATIVE ANATOMY OF DOMESTIC ANIMALS.

COURSE XXXI.—*Veterinary Science.*—This course consists in a study of the bones, articulations, muscles, circulatory apparatus, the nervous system, the respiratory

system, the organs of digestion, the urino-genital apparatus and the organs of special sense, supplemented by demonstrations from mounted skeletons, prepared specimens, charts and an Auzoux clastic model.

COURSE XXXV.—*Veterinary Science.*—This is a continuation of the work described in Course XXXI. Dr. McNeall.

THE AGRICULTURAL CLUB.

A Students' Agricultural Club holds weekly meetings in Agricultural Hall for the consideration of current topics in agriculture. A students' reading room is also maintained there, and all the leading agricultural journals are kept on file for the use of agricultural students. The College library contains an extensive list of agricultural and scientific publications to which students are referred for original research and study.

A Science Club holds weekly meetings in Morrill Hall, and there are in addition seven literary societies that hold their weekly meetings each Saturday evening and serve to supplement the literary work of the college. All students are urged to join in the work of the agricultural club and advised to join one of the literary societies and to avail themselves of these other adjunct means of instruction. The faculty of clear and concise thinking and speaking is of incalculable value to the agricultural student.

REMUNERATIVE AND INSTRUCTIVE LABOR.

The Agricultural courses afford opportunity to do considerable work in the fields and about the barns and grounds, much of which is instructive and of practical educational value. The compensation for services of this kind ranges from 8 to 15 cents per hour, according to the merit of the work. Students are thus able to earn from one-fourth to one-half their expenses and at the same time materially strengthen the practical side of their education. A number of the strongest and most capable students have been aided in finding employment during

vacations with successful stockmen and on good farms. Some young men have preferred to take a year of practical work in this way during their course, and it has invariably proved of marked benefit and enabled them to command more desirable and remunerative positions at the completion of their college work. Too much emphasis cannot be placed on a thorough understanding of the practical application of correct principles in agriculture.

SPECIAL COURSES.

Students desiring shorter courses of study will be permitted to take up special courses in Stock Judging, Feeding and Breeding, Practical Agriculture, Dairying, Horticulture or Agricultural Chemistry, subject to the approval of the head of the division and those in immediate charge of the work. Such courses may cover a period of one term, one year or two years, but special students are advised to take not less than one year's work in any chosen branch and in all cases where practicable or possible to do so, students are urged to complete the four years' course. The results will fully justify the time and expense required and modern agriculture demands thorough training, special fitness, and a high order of ability. No degrees are granted for less than four years' work.

POST GRADUATE COURSES.

Post graduate courses are offered in the following lines:

1. Practical Agriculture, major or minor in
   - (a) Field Crops.
   - (b) Farm Management.
   - (c) Drainage.
2. Dairying.
   - (a) Butter Making.
   - (b) Cheese Making.
   - (c) Farm Dairying.
   - (d) Dairy Bacteriology.

3. Animal Husbandry.
   (a) Study of Breeds.
   (b) Stock Judging.
   (c) Practical Management of Stock.
   (d) Feeds and Feeding.
   (e) Heredity.
4. Horticulture, major or minor in
   (a) Pomology.
   (b) Olericulture.
   (e) Forestry.
5. Agricultural Chemistry, major or minor in
   (a) Organic Agricultural Cremistry.
   (b) Inorganic Agrilcultural Chemistry.

The four year courses lead to the degree of B. S. A., Bachelor of Scientific Agriculture. Graduate students are eligible for the degree of M. S. A.,—Master of Scientific Agriculture. This degree is granted only to students who have completed a four year course in this or some similar college and completed a two year post graduate course in scientific and practical agriculture, one year of which must be resident work at this college. The work required for a post graduate degree is largely in the nature of personal research and investigation under the direction of the professors in charge of the studies chosen. The work selected must embrace a major and a minor subject in different departments.

CREDITS FOR PRACTICAL WORK.

Agricultural students who by previous agreement with the head of the department, do practical work on farms, horticultural or feeding or breeding establishments, beet sugar factories or forestry reservations, of recognized standing, during their course of study will be allowed credits on the following basis: Students who take practical work of the kind described under the direction of the proprietor and render competent and faithful service, will, on their return to the colege and the presentation of a

concise written report or resume of their observations and experience, be entitled to the following credits in the four year course in Agriculture:

For three months, five hours of elective work in the Junior or Senior year; for six months, eight hours; and for one year, ten hours; not more than five hours of which shall be credited in any one term of the college course.

CLAY, ROBINSON & CO. FELLOWSHIP.

At the International Live Stock Exposition held at Chicago in December, 1900, the college won $200 of the special prizes offered by Clay, Robinson & Co. This has been used to establish a fellowship in Animal Husbandry which will be awarded to the tudent having the best standing in that subject in the graduating class of 1901. This fellowship will probably be made permanent.

POSITIONS.

The demand for competent young men thoroughly trained in practical and scientific agriculture and dairying exceeds the supply. We are in constant receipt of inquiries for men combining college training with practical experience and natural ability. There appears to be no limit to the demand for the right kind of men and the compensation for such service is not exceeded in any other calling. In view of this demand for trained minds in the field of agriculture, students are urged to take a full four years' course, supplemented with extensive practical work and observation. To this end, a number of our best students have taken a term or a year out during their course on some of the best farms of this and other states; and others have secured employment in large dairy and horticultural establishments where the most valuable practical experience can be acquired. The importance of this feature of preparation cannot be overestimated and it is urged and recommended even where young men are entirely familiar with ordinary agricultural work. It enables the student to

derive more benefit from his course in college and fits him for a better and more lucrative position after graduation.

AGRICULTURE.

FRESHMAN YEAR.

FIRST TERM.

Live Stock and Score Card Practice, 4.	(Animal Husbandry, I.)
Shop Work, 1.	(Mechanical Engineering, XXXVII.)
Algebra, 5.	(Mathematics, XII.)
Elementary Rhetoric, 5.	(English, II.)
Elocution, 2.	(Elocution, I.)
*Latin, 5, *or*	(Latin, I.)
French, 5, *or*	(Languages, I.)
German, 5, *or*	(Languages, V.)
History, 5.	(History, I.)
Military Drill, 2.	(Military, I.)
Library Work, 4 hours per term.	(Library, I.)

SECOND TERM

Live Stock and Score Card Practice, 4.	(Animal Husb., II.)
Horticulture, 3.	(Horticulture, I.)
Advanced Algebra and Plane Geometry,	(Mathematics, XIII.)
Elementary Botany, 2.	(Botany, I.)
Entomology, 2.	(Zoology, I.)
Advanced Rhetoric, 5.	(English, III.)
Elocution, 1.	(Elocution, II.)
*Latin, 5, *or*	(Latin, II.)
French, 5, *or*	(Languages, II.)
German, 5, *or*	(Languages, VI.)
History, 3.	(History, II.)
Military Drill, 2.	(Military, II.)
Library Work, 4 hours per term.	(Library, II.)

*Optional.

SOPHOMORE YEAR.

FIRST TERM.

Olericulture, 2.	(Horticulture, V.)
Solid Geometry and Plane Trigonometry, 5.	(Mathematics, VI.)
Mechanics and Heat, 3.	(Physics, V.)
Botany, Ecology, 2.	(Botany, II.)
Cryptogamic Botany, 4.	(Botany, IV.)
Vertebrate Zoology, 4.	(Zoology, II.)
Meteorology, 3.	(Geology, I.)
Composition, 1.	(English, V.)
Military Drill, 2.	(Military, III.)

SECOND TERM

Agricultural Physics, 2.	(Agriculture, II.)
Farm Drainage, 2.	(Agriculture, IV.)
Forestry, 2.	(Horticulture, II.)
Histology, 4.	(Botany, III.)
Invertebrate Zoology, 4.	(Zoology, III.)
Composition, 1.	(English, IV or VI.)
Military Drill, 2.	(Military, IV.)

*JUNIOR YEAR.

FIRST TERM.

Soil Physics, 2.	(Agriculture, III.)
Farm Dairying, 4.	(Dairying, XIII.)
Principles of Heredity, 2.	(Animal Husbandry, III.)
Pomology, 3.	(Horticulture, IV.)
Chemistry, 4.	(Agricultural Chemistry, II.)

Elective.

Histology, 3.	(Veterinary Science, XVI.)
Physiology, 4.	(Veterinary Science, XVII.)
Shop Work, 1.	(Mechanical Engineering, XXXVIII.)

*In the Junior year the student is permitted to select from the list of each term a number of studies aggregating not less than sixteen, nor more than twenty exercises each week, but no agricultural study can be omitted.

Surveying, 4.	(Civil Engineering, VIII.)
Analytical Geometry, 5.	(Mathematics, VIII.)
Photography, 2.	(Physics, IX.)
Physical Laboratory, 1 or 2.	(Physics, XIV.)
Advanced Cryptogamic Botany, 3.	(Botany, VI.)
Economic Botany, 2.	(Botany, X.)
Economic Entomology, 5.	(Zoology, IV.)
Embryology, 3 *to* 5.	(Zoology, V.)
Geology, 5.	(Geology, II.)
Political Economy, 5.	(Economic Science, I.)
English Literature, 3.	(Literature, I.)
Debating, 1.	(English, VII.)
Elocution, 2.	(Elocution, III.)
Latin, 5, *or*	(Latin, I.)
German, 5, *or*	(Languages, V.)
Mediaeval History, 3.	(History, III.)
Military Science, 1.	(Military, V.)

SECOND TERM

Farm Dairying, 3.	(Dairying, XIV.)
Field Work, 2.	(Horticulture, VI.)
Chemistry, 3.	(Agricultural Chemistry, III.)
Bacteriology, 2.	(Botany, VII.)
Public Speaking, 1.	(Elocution, VIII.)

**Elective.*

Roads and Pavements, 2.	(Civil Engineering, XI.)
Advanced Analytical Geometry, 3.	(Mathematics, XI.)
Vegetable Cytology, 3.	(Botany, XII.)
Systematic Botany, 3.	(Botany, XV.)
Animal Parasites, 2.	(Zoology, VIII.)
Mineralogy, 4.	(Geology, VI.)
Political Economy, 3.	(Economic Science, II.)
English Literature, 5.	(Literature, II.)
Elocution, 2.	(Elocution, IV.)
Latin, 5, *or*	(Latin, II.)
French, 5, *or*	(Languages, II.)
German, 5, *or*	(Languages, VI.)
Modern History, 3.	(History, IV.)
Military Science, 1.	(Military, VI.)

*SENIOR YEAR.

Group A. General Agriculture.

FIRST TERM.

Field Crops and Farm Management, 3. (Agriculture, V.)
Landscape Gardening, 2. (Horticulture, VIII.)
Chemistry, 4. (Agricultural Chemistry, IV.)
Agrostology, 2. (Botany, XIII.)

Elective.

Dairy Bacteriology, 2. (Dairying, XV.)
Dairying, 3. (Dairying, XVI.)
Advanced Work in Live Stock and Score Card Practice, 2. (Animal Husbandry, V.)
Chemistry, 4. (Agricultural Chemistry, VII.)
Comparative Physiology, 1. (Veterinary Science, XVII.)
Anatomy of Domestic Animals, 3. (Veterinary Science, XXXI.)
Principles of Horse Shoeing, 1. (Veterinary Science, XLI.)
Sanitary Science, 2. (Veterinary Science, LIX.)
Examinations for Soundness, 2. (Veterinary Science, LX.)
Agrostology, 2. (Botany, XIII.)
Evolution of Plants, 1. (Botany, XIX.)
Embryology, 3 *to* 5. (Zoology, V.)
Geology, 5. (Geology, II.)
Political Economy, 3. (Economic Science, III.)
Psychology, 5. (Psychology, I.)
Fiction, 3. (Literature, III.)
Elocution, 2. (Elocution, V.)
Oration, 1. (Elocution, IX.)
Latin, 4, *or* (Latin, III.)
German, 4, *or* (Languages, VII.)
French, 4. (Languages, III.)

*In the Senior year the student is permitted to select from any one of the groups in this course a number of studies not agregating less than sixteen, nor more than twenty exercises per week each term, but no agricultural study can be omitted.

History, Development of the United States, 3. (History, V.)
Military Science, 1. Military, VII.)

SECOND TERM

Field Crops and Farm Management, 3. (Agriculture, VI.)
Feeds and Feeding, 5. (Animal Husbandry, IV.)
Thesis, 1.

Elective.

Dairying, 3. (Dairying, XVII.)
Advanced Work in Live Stock and Score Card Practice, 2. (Animal Husbandry, VI.)
Evolution of Cultivated Plants, 1. (Horticulture, VII.)
Literature of Horticulture, 1. (Horticulture, IX.)
Comparative Physiology, 1. (Veterinary Science, XXXII.)
Principles of Horse Shoeing, 1. (Veterinary Science, LI.)
Sanitary Science, 2. (Veterinary Science, LXXI.)
Anatomy of Domestic Animals, 3. (Veterinary Science, XXXV.)
Calculus, 5. (Mathematics, IX.)
Vegetable Physiology, 2. (Botany, XI.)
Evolution of Animals, 1. (Zoology, VI.)
Geology, 5. (Geology, IV.)
Ethics, 3. (Psychology, II.)
American Literature, 3. (Literature, IV.)
Elocution, 1. (Elocution, VI.)
History of Civilization, 3. (History, VI.)
Military Science ,1. (Military, VIII.)

GROUP B. DAIRYING.

FIRST TERM.

Field Crops and Farm Management, 3. (Agriculture, V.)
Dairy Bacteriology, 2. (Dairying, XV.)
Dairying, 3. (Dairying, XVI.)
Landscape Gardening, 2. (Horticulture, VIII.)
Chemistry, 4. (Agrilcultural Chemistry, IV.)
Dairy Machinery, 1. (Mechanical Engineering, XL.)

Elective.

Additional Dairying, 4. (Dairying, III.)
Advanced Work in Live Stock and Score Card Practice, 2. (Animal Husbandry, V.)
Chemistry, 4. (Agricultural Chemistry, VII.)
Anatomy of Domestic Animals, 3. (Veterinary Science, XXXI.)
Agrostology, 2. (Botany, XIII.)
Geology, 5. (Geology, II.)
Political Economy, 3. (Economic Science, III.)
Psychology, 5. (Psychology, I.)
Fiction, 3. (Literature, III.)
Elocution, 2. (Elocution, V.)
Oration, 1. (Elocution, IX.)
Development of United States History, 3. (History, V.)
Military Science, 1. (Military, VII.)

SECOND TERM

Field Crops and Farm Management, 3. (Agriculture, VI.)
Dairying, 3. (Dairying, XVII.)
Feeds and Feeding, 5. (Animal Husbandry, IV.)
Dairy Sanitation and Obstetrical Diseases, 2. (Veterinary Science, XIV.)
Thesis, 1.

Elective.

Advanced Work in Live Stock and Score Card Practice, 2. (Animal Husbandry, VI.)
Evolution of Cultivated Plants, 1. (Horticulture, VII.)
Literature of Horticulture, 1. (Horticulture, IX.)
Calculus, 5. (Mathematics, IX.)
Advanced Bacteriology, 3. (Botany, VIII.)
Evolution of Animals, 1. (Zoology, VI.)
Geology, 5. (Geology, IV.)
Ethics, 3. (Psychology, II.)
American Literature, 3. (Literature, IV.)
Elocution, 1. (Elocution, VI.)
History of Civilization, 5. (History, IV.)
Military Science, 1. (Military, VIII.)

Group C. Animal Husbandry.

FIRST TERM.

Field Crops and Farm Management, 3. (Agriculture, V.)
Landscape Gardening, 2. (Horticulture, VIII.)
Chemistry, 4. (Agricultural Chemistry, IV.)
Anatomy of Domestic Animals, 3. (Veterinary Science, XXXI.)
Principles of Horse Shoeing, 1. (Veterinary Science, XLI.)
Sanitary Science, 2. (Veterinary Science, LIX.)
Examinations for Soundness, 2. (Veterinary Science, LX.)

Elective.

Dairy Bacteriology, 2. (Dairying, XV.)
Dairying, 3. (Dairying, XVI.)
Comparative Physiology, 1. (Veterinary Science, XVII.)
Chemistry, 4. (Agricultural Chemistry, VII.)
Materia Medica, 1. (Veterinary Science, XXIX.)
Vegetable Pathology, 2. (Botany, V.)
Agrostology, 2. (Botany, XIII.)
Evolution of Plants, 1. (Botany, XIX.)
Embryology, 3 to 5. (Zoology, V.)
Geology. 5. (Geology, II.)
Political Economy, 3. (Economic Science, III.)
Psychology, 5. (Psychology, I.)
Fiction, 3. (Literature, III.)
Elocution, 2. (Elocution, V.)
Oration 1. (Elocution, IX.)
Latin, 4, *or* (Latin, III.)
French 4, *or* (Languages, III.)
German, 4. (Languages, VII.)
History, Development of United States, 3. (History, V.)
Military Science, 1. (Military, VII.)

SECOND TERM

Field Crops and Farm Management, 3. (Agriculture, VI.)
Feeds and Feeding, 5. (Animal Husbandry, IV.)
Advanced Work in Live Stock and Score Card Practice, 2. (Animal Husbandry, VI.)

Anatomy of Domestic Animals, 3. (Veterinary Science, XXXV.)
Principles of Horse Shoeing, 1. (Veterinary Science, I.)
Sanitary Science, 2. (Veterinary Science, LXXI.)
Evolution of Animals, 1. (Zoology, VI.)
Thesis, 1.

Elective.

Dairying, 3. (Dairying, XVII.)
Evolution of Cultivated Plants, 1. (Horticulture, VII.)
Literature of Horticulture, 1. (Horticulture, IX.)
Research in Horticulture, 2. (Horticulture, X.)
Dairy Sanitation and Obstetrical Diseases, 2. (Veterinary Science, XIV.)
Comparative Physiology, 1. (Veterinary Science, XXXII.)
Materia Medica, 1. (Veterinary Science, XXXIII.)
Jurisprudence, 1. (Veterinary Science, LXXIV.)
Astronomy, 5. (Civil Engineering.)
Calculus, 5. (Mathematics, IX.)
Advanced Bacteriology, 3. (Botany, VIII.)
Vegetable Physiology, 2. (Botany, XI.)
Geology, 5. (Geology, IV.)
Ethics, 3. (Psychology, II.)
American Literature, 3. (Literature, IV.)
Elocution, 1. (Elocution, VI.)
History of Civilization, 5. (History, VI.)
Military Science, 1. (Military, VIII.)

Group D. Horticulture.

FIRST TERM.

Field Crops and Farm Management, 3. (Agriculture, V.)
Greenhouse Management, 2. (Horticulture, II.)
Landscape Gardening, 2. (Horticulture, VIII.)
Chemistry, 4. (Agricultural Chemistry, IV.)
Agrostology, 2. (Botany, XIII.)

Elective.

Dairying, 3. (Dairying, XVI.)
Advanced Work in Live Stock and Score Card Practice, 2.

(Animal Husbandry, V.)
Chemistry, 4. (Agricultural Chemistry, VII.)
Anatomy of Domestic Animals, 5. (Veterinary Science, I.)
Seed Testing, 2. (Botany, XIV.)
Vegetable Pathology, 2. (Botany, V.)
Embryology, 3 *to* 5. (Zoology, V.)
Geology, 5. (Geology, II.)
Psychology, 5. (Psychology, I.)
Fiction, 3. (Literature, III.)
Elocution, 2. (Elocution, V.)
Oration, 1. (Elocution, IX.)
Latin, 4, *or* (Latin, III.)
French, 4, *or* (Languages, III.)
German, 4, *or* (Languages, VII.)
History, Development of United States, 3. (History, V.)
Military Science, 1. (Military, VII.)

SECOND TERM

Field Crops and Farm Management, 3. (Agriculture. VI.)
Feeds and Feeding, 5. (Animal Husbandry, IV.)
Literature, 1. (Horticulture, IX.)
Research, 2. (Horticulture, X.)
Vegetable Physiology, 2. (Botany, V.)
Thesis, 1.

Elective.

Dairying, 3. (Dairying XVII.)
Advanced Work in Live Stock and Score Card Practice, 2. (Animal Husbandry, VI.)
Veterinary Medicine, 5. (Veterinary Science, XXVIII.)
Calculus, 5. (Mathematics, IX.)
Advanced Bacteriology, 3. (Botany, VIII.)
Evolution of Animals, 1. (Zoology, VI.)
Geology, 5. (Geology, IV.)
Ethics, 3. (Psychology, II.)
American Literature, 3. (Literature, IV.)
Elocution, 1. (Elocution, VI.)
History of Civilization, 5. (History, VI.)
Military Science, 1. (Military, VIII.)

EXPERIMENT STATION

STATION STAFF.

W. M. BEARDSHEAR, A. M., LL. D.,
President.

*JAMES WILSON, M. S. Ag.,
Dean of the Division of Agriculture.

C. F. CURTISS, B. Sc., M. S. Ag.,
Director and Agriculturist.

J. B. WEEMS, Ph. D.,
Chemist.

L. H. PAMMEL, B. Ag., M. Sc., Ph. D.,
Botanist.

H. E. SUMMERS, B. S.,
Entomologist.

HOMER C. PRICE, M. S.,
Horticulturist.

JOHN A. CRAIG, B. S. A.,
Animal Husbandry and Assistant Director.

JOHN J. REPP, V. M. D.,
Veterinarian.

G. L. McKAY,
Dairying.

JAMES ATKINSON, B. S. Ag.,
Assistant in Agriculture.

JOSEPH J. EDGERTON, B. S. Ag.,
Assistant in Agricultural Physics.

C. H. ECKLES, B. Agr., M. Sc.,
Assistant in Dairying and Diary Bacteriologist.

C. E. ELLIS, B. S. A.,
Assistant Chemist.

*Granted an indefinite leave of absence as Secretary of Agriculture.

CHARLOTTE M. KING,
Artist.

E. E. LITTLE, B. S. A.,
Assistant Horticulturist.

F. R. MARSHALL, B. S. A.,
Assistant in Animal Husbandry.

ED. H. WEBSTER, B. S. A.,
Assistant in Dairying.

F. W. FAUROT, B. Sc.,
Assistant in Botany.

A. ESTELLA PADDOCK, B. Sc.,
Assistant in Botany.

EXPERIMENT STATION.

The investigations of the Experiment Station have an intimate relation to the college work of instruction, as the problems occupying the attention of the Station are those that have a material bearing on the profit of the farm, and they are also those that are timely, and in need of accurate investigation. Whether relating to the field or the feed lot, the aim is to investigate those questions which will have a practical relation to successful agriculture. Originality is made a feature of the work so far as it is consistent with useful results, and in all instances the sole object is to throw light on the truth relating to the various principles and practices of the farm. The field work strongly supports the instruction of the College in regard to the varieties of grains and the method of cultivation, thus enabling the student to become acquainted with the latest ideas relating to these. Thorough tests are made of the different varieties of fodders, grasses and grains. In addition to this, complete trials, embodying various crops and systems of culture, are carried on extensively each year, with the hope of giving direction to the farm management that is best for Iowa.

The investigations with animals embrace a study of the value of different feeds for different features of animal

production. The system of feeding, the preparation of different feeds are also made the subjects of investigation as far as it is thought they may be made a part of the methods of the Iowa farmer. Included with these, there have been a large number of trials with the different types of animals suitable for the requirements of the market. The object sought in this department of the Station work has been to indicate the manner in which the Iowa farmer through the employment of animals can realize the most from his farm products and add to the fertility of the farm. The Experiment Station has reached out in this way to a remarkable degree, bringing sheep from Mexico, Colorado and Scotland, cattle from Texas and Great Britain, horses from Wyoming, Montana and Europe, in its endeavor to thoroughly study this very important feature of the farmer's work. The data from these experiments is always accessible to the student and he has the opportunity of daily observing the development of it at every stage.

The dairy industry is already indebted to the Experiment Station for doing much towards establishing it on a surer foundation of accurate knowledge. The Station has always kept in closest touch with those engaged in the various lines of the dairy industry. Some of the problems which practical men are constantly meeting and asking aid in solving, are at all times objects of experiment by the Dairy Section. The students have the advantage of seeing these experiments carried out, and in some cases assist in the work themselves. In this way they learn not only what are the chief problems to be solved, but become informed on the methods employed in different lines of investigation. The experimental work that has been so far conducted, relates mainly to the various problems of buttermaking, while lately features of cheesemaking have been made subjects of special study. The records of these are abundantly used in class work, together with the results from the later investigations in the newer field of bacteriology.

The Horticultural Department in its connection with the Experiment Station affords the student admirable op-

portunities for checking the theory of the class room against the practice of the field. The connection of the Department of Horticulture with the State Horticultural Society is such that problems touching the commercial side of fruit growing receive the closest attention. The field equipment of the Department is excellent, so that experiments in spraying for the prevention of fungous pests and injurious insects may be carried on under the eye of the student; this is true also of other phases of orchard routine, such as fertilizing, pruning and thinning. The experimental nursery work carried on is of decided educational value. In plant breeding, extensive experiments have been inaugurated and are still in progress. The Station work thus equips the student with the practice and technique necessary to a thorough horticultural training.

DIVISION OF VETERINARY MEDICINE.

FACULTY.

W. M. BEARDSHEAR, A. M., LL. D., PRESIDENT,
President of the College and Acting Dean.

JOHN J. REPP, V. M. D.,
Professor of Histology, Pathology, Materia Medica, and Therapeutics.

LOUIS A. KLEIN, V. M. D.,
Professor of Veterinary Medicine, Sanitary Science and Physiology.

JOHN H. McNEALL, V. M. D.,
Profesor of Anatomy and Principles and Practice of Surgery.

M. STALKER, M. Sc., V. S.,
Lecturer on Examination for Soundness.

W. L. JOHNSON, D. V. M.,
Resident Surgeon of the Veterinary Hospital and Demonstrator of Anatomy.

GEORGE JUDISCH,
Director of the Hospital Dispensary and Lecturer on Pharmacy.

ALFRED ALLEN BENNETT, M. Sc.,
Profesor of Chemistry.

LOUIS HERMANN PAMMEL, B. Ag., M. Sc., PH. D.,
Professor of Botany and Bacteriology.

HENRY E. SUMMERS, B. S.,
Professor of Zoology and Animal Parasites.

CHARLES F. CURTISS, M. S. Ag.,
Professor of Principles of Heridity.

GEN. J. RUSH LINCOLN,
Professor of Military Science and Tactics.

C. H .ECKLES, B. A., M. Sc.,
Lecturer on Milk Inspection.

MISS LOLA PLACEWAY, B. Sc.,
Instructor in Chemistry.

MISS HAZEL LEONI BEARDSHEAR, B. L.,
Instructor in Chemistry.

MISS A. ESTELLA PADDOCK,
Instructor in Botany.

F. W. FAUROT. B. S.,
Instructor in Botany.

C. G. LEE, B. S., LL. B.,
Lecturer in Jurisprudence.

MISS VINA ELETHE CLARK,
Librarian.

MISS OLIVE E. STEVENS, B. L.,
Assistant Librarian.

DIVISION OF VETERINARY MEDICINE.

The course in Veterinary Medicine is most thorough and complete and is equal to any offered in this branch of the Natural Sciences. A broad foundation is laid at the outset to enable the student to take a comprehensive and proper view of the subject. In the beginning of the course he is shown the relation existing between the three great kingdoms of nature—animal, vegetable and mineral—and the biological and chemical forces that govern them, especially their application to animal life. With an understanding of the life, growth and existence of the normal animal, the student is then introduced to the various influences which operate to mar or disturb this condition, such as environment, use, climatic conditions, and vegetable (bacteria and fungi) and animal parasites. The alterations produced in the tissues of the normal animal by these agencies, the disturbance of function which they cause, and the power of medicines and surgical interference to afford relief are studied in detail. The relations existing between disease in animals and in man, and the several avenues of transmission, are all given proper attention, and in the end the student is fitted not only to deal with the ordinary problems presented in veterinary practice, but also to work out and elucidate the complex and strange conditions

so frequently met with. The treatment of sick and disabled animals is only a small part of the modern veterinarian's work; in fact, it is in the line of preventative medicine that he is able to render the most valuable service, and this course is designed to prepare the student to enter upon any part of this broad field of labor.

The methods of instruction are such as to prevent superficial study and are calculated to give the student a thorough knowledge of the subject. Both the lecture and the text-book methods are used, and the class-room work is supplemented by practical work in the hospital and the clinics, and by systematic courses in the laboratories. Being so endowed as to be independent of student's fees for support the college is enabled to require only high attainments and ability on the part of the students without regard to numbers.

The Veterinary Hospital and the daily free clinics furnish an abundance of material for practical work. Situated in an extensive stock-growing district, the College is especially favored in this respect, not only horses, but all species of animals, being brought to the hospital for treatment. Senior students are asigned cases for diagnosis and treatment under the supervision of the clinical professor, thus having an opportunity to apply the theoretical knowledge obtained in the class-room. During the course opportunity is afforded to witness all the different surgical operations performed in veterinary surgery, together with the methods of treating the different internal diseases. Junior students are detailed in alphabetical order to assist the pharmacist in the compounding of prescriptions, in this way becoming familiar with the various forms in which medicines are administered. A detailed description of the various branches taught in the course is given on the succeeding pages.

The department occupies quarters in Agricultural Hall. In this building are offices for the veterinary members of the Faculty, two large lecture rooms for the use of the department and a museum.

The Veterinary Hospital is a substantial brick building three stories high, fitted with commodious, well lighted single and box stalls, operating room, office and pharmacy, resident surgeon's room, dissecting room, an elevator for the accommodation of patients unable to use the runway to second floor, and is furnished with all the surgical instruments of modern construction, operating table and other important conveniences for hospital work. A number of fine grass paddocks directly adjacent to the hospital are used for such patients as are likely to be benefitted by outdoor exercise and a grass diet in the season.

Aside from the facilities which belong especially to the Veterinary Department, the work in botany, chemistry, zoology, and other related studies is adequately provided for in the special buildings for the accommodation of these several departments of college work.

A laboratory constituting part of the Experiment Station has recently been equipped. This laboratory is intended for the purpose of bacteriological and pathological investigation of the diseases of the domestic animals. It is supplied with the most modern biological apparatus, such as high power microscopes, incubators, hot air and steam sterilizers, microtomes, stains, gas, water and electric light, and in fact all first-class facilities for scientific investigation. Specimens are received frequently for examination. Students of the Veterinary Department may avail themselves of these facilities.

COMPARATIVE ANATOMY OF THE DOMESTIC ANIMALS.

DR. MCNEALL.

This subject is studied through the entire Freshman and Junior years and embraces Descriptive and Practical Anatomy.

Descriptive Anatomy is taught by a series of lectures, including the study of the bones, articulations, muscles, circulatory apparatus, the nervous system, the respiratory

system, the organs of digestion, the urino-genital apparatus, and the organs of special sense. The lectures are supplemented by demonstrations from mounted skeletons, prepared specimens, charts and an Auzoux clastic model.

Practical Anatomy comprises a comprehensive and thorough course in dissection, which extends through the Freshman and Junior years. During each year the student is required to make two complete dissections of the horse and such parts of other animals as may be deemed necessary. Freshman students devote their time in the dissecting room to the study of the bones, articulations and muscles. Junior students make special dissection of the nervous system, circulatory apparatus, lymphatic glands, organs of special sense and the organs contained in the abdominal and thoracic cavities. The dissection is carried out in a systematic manner under the personal supervision and direction of the Profesor of Anatomy. Each student is required to properly dissect and pass an examination on the part assigned before passing to the dissection and study of another part.

The subject is taught in four courses, as follows:

Course XXXI.—First term, Freshman year, three lectures each week.

Course XXXV.—Second term, Freshman year, three lectures each week.

Course XXXIX.—First term, Junior year, three lectures each week.

Course XLIX.—Second term, Junior year, three lectures each week.

HISTOLOGY.

DR. REPP.

This subject is taught throughout the Freshman year by one lecture and one laboratory exercise each week.

Course XXX.—This is given during the first term of the Freshman year. The subject is taught chiefly in the laboratory. Descriptions of the microscopic structure of

the tissues are given and the students are required to observe these features for themselves by the aid of the microscope. Students are taught how to collect, fix, imbed, section, stain, mount and preserve the normal tissues of the various species of domestic animals and to study them under the microscope.

COURSE XXXIV.—A continuation of the subject in the second term of the Freshman year. Piersol's Histology is used.

COMPARATIVE PHYSIOLOGY.

DR. KLEIN.

Physiology is studied by the comparative method, the vital functions of the different species of the domestic animals and those of the human body being compared and the common features and the variations pointed out. The subject is taught in four courses.

COURSE XVII.—The physical and chemical laws, as they are related to physiology, and the general properties of animal cells, their origin, development and growth are studied in the first term of the Freshman year, one hour each week.

COURSE XXXII.—This course is given in the second term of the Freshman year, one hour each week, and is a continuation of Course XVII. Both of these courses are introductory to Course XXXVIII and Course XLVIII.

COURSE XXXVIII.—The study of the special physiology of the various organs and tissues is begun in the first term of the Junior year, two hours each week being given to the subject.

COURSE XLVIII.—This course is a continuation of Course XXXVIII. It is given in the second term of the Junior year, two hours each week.

"A Manual of Veterinary Physiology," by F. Smith, is used in these courses.

PRINCIPLES OF HEREDITY.

PROFESSOR CURTISS.

This course (Animal Husbandry V.), given in the first term of the Freshman year, embraces a study of the principles of breeding, including selection, heredity, atavism, variation, fecundity, with a presentation of the methods of breeding, in-and-in breeding, cross breeding, etc., and a historical study of their results. In addition, the several features relating to the higher breeding of pure bred stock are made the subject and investigation.

STRUCTURAL BOTANY.

PROFESSOR PAMMEL.

COURSE IX.—This course begins in the first term of the Freshman year. The work consists of recitations and lectures. The student is expected to become familiar with the morphology of flowering plants and the terms used in descriptive botany. In the study of identification and selection of drugs it is necessary to have a thorough botanical knowledge of general structural botany as well as vegetable histology. Vegetable drugs do not always consist of the entire plant, but frequently of only parts. In this course the general structure of the plant, from the root to reproductive organs, is taken up and considered. In the laboratory the student takes up the histology of plants, especially from the standpoint of pharmacognosy, with a brief survey of the more important plants from a systematic standpoint.

MATERIA MEDICA.

DR. REPP.

This is taught throughout the Freshman year by one lecture per week.

COURSE XXIX.—This study is entered upon at the beginning of the Freshman year. The subject is taught by a

systematic course of lectures. Samples of the drugs and preparations discussed in the lectures are exhibited to the students who are required to inspect them in order to become intimately acquainted with the leading properties of the various drugs. The discussion includes all the preparations used in veterinary theapeutics. In order to connect this subject as closely as possible with therapeutics and to facilitate the study of that branch later on the same classification of drugs is followed as in the study of therapeutics. Special lectures are devoted to an introduction to the subject dealing with classification and definition of terms. In case of each drug attention is called to the following features or such part of them as the character of the drug demands: Botanical name, natural order, habitat, description of properties, method of preparation, adulterations, names of therapeutic actions, preparations official in the United States Pharmacopoeia.

COURSE XXXIII.—This is a continuation of the study throughout the second term of the Freshman year.

PHARMACY.

MR. JUDISCH.

This subject is taken up in the first term of the Freshman year and continued throughout the year. It consists of lectures and laboratory work.

COURSE XL.—All the official drugs and preparations are considered. Special attention is paid to practical pharmaceutical problems and manipulations. Each student is required to prepare at least one of each class of the official preparations. This course is given in the first term of the Freshman year and consists of one lecture and one laboratory exercise each week.

COURSE XXXVII.—In the second term of the Freshman year one lecture and one laboratory exercise each week are devoted to the principles and practical work of the compounding of prescriptions.

THERAPEUTICS.

DR. REPP.

This subject is taught by one lecture per week throughout the Junior and the Senior year.

COURSE XLIV.—This is begun at the opening of the first term of the junior year. It is taught by a systematic course of lectures, but is supplemented by text-book reading by the student. This course is largely made up of the general consideration of the subject including such topics, as: Definition of terms, manner of administration, modes of absorption, channels of elimination, effects of drugs, agencies which modify the action of drugs. There is then taken up a study of the individual drugs. The discussion of each drug is taken up at the point where it was laid down in materia medica. The drugs are classified according to their dominant action into systemic and extraneous remedies; the systemic remedies are divided into two classes, viz: Local remedies and general remedies. Each drug is studied according to the following outline: Pharmaceutical name, physiological action on the various tissues and organs, therapeutic action, toxic action and antidotes, method of administration, contraindications and dosage. This course is supplemented by a consideration of the subject of prescription-writing.

COURSE XXXVI.—A continuation of the subject throughout the second term of the junior year.

COURSE LXII.—A continuation of the subject throughout the first term of the senior year.

COURSE LXXIII.—A continuation of the subject throughout the second term of the senior year.

H. C. Wood's "Therapeutics, Its Principles and Practice" is used as a text book.

PATHOLOGY.

DR. REPP.

This is taught by two lectures per week throughout the junior and the senior year and one laboratory exercise per week during the junior year.

Two subdivisions of the subject are made, viz: General Pathology and Special Pathology. In connection with each morbid process the pathological anatomy both macroscopic and microscopic, the morbid physiology and etiology are considered. The subject is taught by lectures. The diseases of domestic animals are made the basis of the work. The discussions are confined strictly to animal pathology.

COURSE XLIII.—This is taken up during the first term of the junior year. It consists in a study of the elementary morbid processes, viz: The infiltrations, degenerations, atrophy, hypertrophy, necrosis, gangrene, hyperaemia, ischemia, thrombosis, embolism, hemorrhage, infarction.

COURSE LII.—This is presented during the second term of the junior year. It completes the study of general pathology by a consideration of the composite morbid processes, viz: Inflammation, including the chronic specific inflammations, regeneration, and tumor formation. Also, the study of special pathology, that is, the consideration of diseases which occur in the individual tissues and organs, is begun.

COURSE LXI.—This continues the study of special pathology throughout the first term of the senior year.

COURSE LXXII.—This continues the study of special pathology throughout the second term of the senior year.

Microscopic pathology is taught in the laboratory during the junior year in connection with Courses XLIII and LII. The students are taught to collect, fix, imbed, section, stain, mount and preserve pathological specimens and to determine their characters under the microscope. Gross

morbid anatomy is taught by autopsy and by the presentation to the students of both fresh and preserved specimens.

Stengel's "A Text-book of Pathology" and Friedberger and Frohner's "Pathology and Therapeutics" are used for reference.

ENTOMOLOGY.

PROFESSOR SUMMERS.

This course (Zoology I), given during the second term of the Freshman year, is designed as an introduction to Zoological methods, especially to those of Systematic Zoology. The student also gets practice in the determination of insects, which is of special use later in his study of the parasites of domestic animals. Some training is had in the use of the microscope. The lectures deal chiefly with the physiology and life history of the different orders of insects. Incidentally the general principles involved in dealing with injurious insects, including parasites, are discussed.

CHEMISTRY.

PROFESSOR BENNETT.

For description of work done in this subject see Courses I, IV, X and XIII under Chemical Department in the Division of Sciences as Related to the Industries.

Laboratory study is the basis of the work done in chemistry. The student is given an opportunity during the first year of the Veterinary Course to become acquainted with Inorganic Chemistry and the general principles of Qualitative Analysis. Special attention is given to those compounds that are important in Veterinary Medicine. Attention is also given to inorganic poisons and the general effects of these poisons on the animal body.

During the first term of the Junior Year the students in Veterinary Medicine are given a course in Organic

Chemistry in which they become acquainted with the various hydro-carbons, carbo-hydrates, and nitrogenous compounds, special attention being directed to those substances used in pharmaceutical preparations.

During the second term of the junior year the student studies elementary Physiological Chemistry and a sufficient amount of the general principles of Quantitative Analysis to enable him to make complete analysis of urine.

The laboratory provides each student with a separate table which is furnished with water, gas, and all the needed apparatus and re-agents. The cost of this work to the student is the cost of the material and apparatus consumed or destroyed in the prosecution of the study.

BACTERIOLOGY.

PROFESSOR PAMMEL.

COURSE VII.—This subject is taken up in the first term of the Junior Year, and is conducted by laboratory work and lectures, covering approximately the following ground:

History. Considering the subject from Leewenhoek's discovery in 1659, followed by the work of Plenciz who assumed a casual relation between micro-organism and contagious diseases. The works of Pollender, Davaine, Henle and Pasteur. Theory of fermentation, Cagniard, Latour and Schwann, Bastian's theory of spontaneous generation; Pasteur's refutation; DeBary's work and higher fungi. The extravagant claims of Hallier and others. Lister's antiseptic treatment of wounds. The work of Cohn, Naegeli, Klebs, Pasteur, Buchner, Brefeld and Koch in cultivating germs. Rapid progress in recent times. Anthrax, tuberculosis and germs in pus. Literature on the subject.

What are bacteria? Structure, growth, nutrition and reproduction.

Morphology and systematic position of bacteria. Their relation to other plants. Classification of Ehrenberg, of

Cohn, of DeBary, of Van Tiegham, of Pasteur, of Flugge, of Zopf. Difficulties in classifying bacteria. Physiological and morphological characters. Methods of sterilization, mounting, staining and inoculation.

History of anthrax, symptomatic anthrax, malignant oedema, tetanus, glanders, tuberculosis, swine plague, hog cholera, typhoid fever, diphtheria. The germs of pus, erysipelas, yellow fever, cholera, cholera nostras, caries of teeth, etc., are discussed. The characteristic growth and the morphological characters of the germs are given. The formation of ptomaines and enzymes and their relation to disease.

Abbott's "Principles of Bacteriology" is used as a text book.

This course consists of seventeen lectures accompanied by seventeen laboratories of two hours each.

VERTEBRATE ZOOLOGY.

PROFESSOR SUMMERS.

This course (Zoology III), given during the first term of the Junior Year, consists mainly of a laboratory study of the anatomy, including histology, of a typical vertebrate. This serves as an introduction to the methods of gross dissection, and gives practice in the use of the microscope. The study of a series of other forms of vertebrates follows, leading to a knowledge of general vertebrate structure. The laboratory work is supplemented by lectures on the general morphology, physiology and classification of vertebrates.

ANIMAL PARASITES.

PROFESSOR SUMMERS.

In the second term of the Junior Year is given a course (Zoology VIII), of lectures upon the Zoo-parasites of domestic animals. Detailed descriptions are given of the life histories of the most important species attacking

animals in the United States, special emphasis being laid upon such portions of their economy as may render them open to treatment by preventive or remedial measurs.

POISONOUS PLANTS.

PROFESSOR PAMMEL.

COURSE XIV.—The veterinarian is frequently called on to investigate poisoning. He should therefore be familiar with the plants responsible for poisoning live stock. In this course the subject is treated from the historical standpoint, with a brief reference to the history of toxicology; auointoxication; poisoning from ptomaines, toxines and the agents responsible for such poisoning; poisoning by fungi, like toadstools, ergot, etc. Dwelling on the life history of these fungi and the poisons they produce; the rusts and smuts, as possible causes of disease. The higher plants are then taken up in a systematic order, calling attention to the poisonous plants in the various orders and means for recognizing these plants. Lectures and laboratory work. Two hours. Second term, Freshman Year.

THEORY AND PRACTICE OF MEDICINE.

DR. KLEIN.

COURSE XLV.—This course is given during the first term of the Junior Year and consists of three lectures each week on the methods of Clinical Diagnosis, supplemented by demonstrations in the hospital and clinics. Correct diagnosis being a first essential in the treatment of disease, the subject is exhaustively considered. The several apparatuses of the animal body are taken up separately and the student is taught to recognize the various disturbances of function and the diseases or pathological conditions they indicate.

COURSE LIV.—During the second term of the Junior

year three lectures are given each week on the sporadic or non-infectious diseases of the domestic animals. Each disease is compared with the similar affection in man, its etiology, pathology, symptoms, course, diagnosis, prognosis, and treatment are considered in detail, the differences peculiar to each species being pointed out. It is the object to teach the student to recognize not only the symptoms of the disease, but also the alterations in the tissues which produce these symptoms, thus fitting him to more successfully prescribe proper treatment, to modify his treatment to meet the demands of each individual case, and to recognize and properly treat atypical cases. The daily clinics and the hospital afford cases for practical demonstration.

COURSE LXIII.—In the first term of the Senior year three lectures each week are devoted to the study of the non-micro-organismal constitutional diseases and the diseases caused by animal parasites.

COURSE LXXV.—The infectious and contagious diseases of the domestic animals are studied in the second term of the Senior Year. Three lectures are given each week on this subject. The characters of the germ causing the disease, the species of animal attacked, the transmissibility to man, the pathological lesions produced, the symptoms, course, diagnosis, prognosis and treatment, are considered in connection with each disease.

PRINCIPLES AND PRACTICE OF SURGERY.

DR. MCNEALL.

This subject is taught to Junior and Senior students in four courses, as follows:

COURSE XLVI.—First term, Junior Year, three lectures each week.

COURSE LV.—Second term, Junior Year, three hours each week.

COURSE LXIV.—First term, Senior Year, three hours each week.

COURSE LXXVI.—Second term, Senior year, three hours each week.

General and Special Surgery is taught in the Junior and the Senior Year, the didactic lectures being supplemented by demonstrations in the clinics.

General Surgery embraces the following subjects: Surgical bacteriology, the pathology and treatment of inflammation, diseases of the bones, nerves, articulations, muscles, tendons, tendon sheaths and bursae; methods of amputation and exarticulation; suturing and the general treatment of wounds; methods of anaesthesia; intra-venous and sub-cutaneous injections; castration; methods of restraint in securing animals, and the methods of actual cautery.

Special Surgery includes the surgical diseases of the head, neck, thorax, abdomen, urino-genital organs, fore-limb, hind-limb, vertebrae, pelvis, and the surgical diseases of the stomach and bowels.

PRACTICAL OPERATIVE SURGERY.

DR. MCNEALL.

In the course in Operative Surgery the student is required to perform all the operations that are found necessary in veterinary practice. Five hours each week are devoted to this work. The subject is covered in two courses, as follows:

COURSE LXV.—First term, Senior Year.

COURSE LXXVII.—Second term, Senior Year.

EMBRYOLOGY.

PROFESSOR SUMMERS.

The foundation of this course (Zoology V), consists of laboratory work on the chick and to a small extent on the frog. The lectures deal with the general principles of development, including the structure of the germ cells, ma-

turation and fertilization, and the modifications of cleavage and gastrulation found in the different classes of vertebrates. The peculiarities of the development of mammals are also discussed.

OBSTETRICS.

DR. REPP.

The course in Embryology given during the first term of the Senior Year is introductory to this subject.

COURSE LXX.—The study of this subject is taken up during the second term of the Senior Year and is taught by a course of two lectures per week. It includes a review of obstetrical anatomy, reproduction, hygiene of pregnant animals, pathology of gestation, normal parturition, dystokia, obstetric operations, accidents of parturition, pathology of parturition, diseases of the young animals. The students are instructed in the use of the various instruments and appliances used in obstetrical practice. The location of the veterinary school in a rich stock-breeding community gives opportunity for considerable practical work.

Fleming's "Obstetrics" is used for reference.

PRINCIPLES OF HORSE-SHOEING.

DR. KLEIN.

COURSE XLI.—In the first term of the Junior Year one hour each week is devoted to the study of the anatomy and physiology of the hoof, the relation between the form of the hoof and the direction of the limb, the variations in the flight of the hoof, the shoeing of normal and irregular hoofs, winter shoeing and hoof nurture.

COURSE LI.—In the second term of the Junior Year the correction of defects in gait and the methods of shoeing

hoofs defective in form or diseased are taken up, one hour each week being devoted to the subjct.

"A Text Book on Horse-Shoeing," by Lungwitz, translated by Adams, is used in these courses.

DENTISTRY.

DR. REPP.

COURSE LVIII.—This is taken up during the first term of the Senior Year, the instruction being comprised in one lecture per week. It embraces a series of lectures covering the anatomy of the organs of mastication especially the teeth, eruption of the teeth, their abnormalities, irregularities, diseases of the teeth and alveoli and treatment for the same. The clinics at the veterinary hospital give the student ample practice in operative dentistry on the domestic animals.

SANITARY SCIENCE.

DR. KLEIN.

In the modern system of medicine the prevention of disease has taken a prominent place, and in this field the veterinarian is called upon to prevent the spread of disease not only from animal to animal but from animal to man and from man to man. The courses described below are designed to prepare the student for this important work.

COURSE LIX.—Two lectures are given each week in the first term of the Senior Year. The following topics are discussed: The great plagues of history, and their sanitary lessons; the various causes of disease; the manner in which disease is propagated and spread, including the part played by meat and milk; the influence of soil, configuration and climatic conditions; the effect of environment, including the ventilation, lighting and drainage of

stables; preventative measures, including disinfection, vaccination and quarantine.

COURSE LXXI.—In the second term of the Senior Year the various infectious, contagious and parasitic diseases are separately considered and the methods of preventing their introduction and suppressing outbreaks is discussed, two lectures being given each week.

MEAT INSPECTION.

DR. KLEIN.

This comparatively new branch of veterinary work is given the attention which its present importance deserves. The subject is approached from the American point of view, and the students are taught how to perform the work with that rapidity and thoroughness required by the U. S. Bureau of Animal Industry. The instruction which the student receives in the courses in anatomy, physiology, pathology, bacteriology, animal parasites and veterinary medicine makes it possible to cover this subject in the two courses described below:

COURSE LVII.—One lecture is given each week in the first term of the Senior Year, embracing the following topics: The physical characters of normal flesh and organs; the methods of slaughter; the principles of refrigeration and preservation; and the effect of accidental and pathological conditions on the preservation and edibility of meats.

COURSE LXVIII.—In the second term of the Senior Year one lecture each week is devoted to the consideration of the putrefaction of meats and the consequences of the ingestion of such meats by man; the effects upon the meat of the various constitutional and infectious diseases; the transmissibility of the disease to man; the effects of cooking on transmissibility; the meat inspection laws of the United States.

MILK INSPECTION.

MR. ECKLES.

This course (Dairy XVIII), given in the second term of the Senior Year, takes up the composition of normal milk and its variations, the Babcock method for finding the amount of butterfat; the use of the lactometer for finding the specific gravity and calculating the milk solids; the common adulterations of milk and their detection. Sufficient practice will be given to enable the student to become familiar with the use and application of these tests.

EXAMINATION FOR SOUNDNESS.

DR. STALKER.

COURSE LX.—In this course, which is given in the first term of the Senior Year, the student is taught how to make a systematic search for disease or pathological conditions, the various conditions likely to be found in each part and the effect they may have on the use of the animal. Two lectures are given each week, supplemented by demonstrations on the living animal.

JURISPRUDENCE.

MR. LEE.

COURSE LXXIV.—The work in this course consists of a study of the rights and duties of the veterinary practitioner; the rights and duties of the owner or value of domestic animals; contracts and sales as applied to dealings in live stock; the subject of expert testimony. One lecture is given each week in the second term of the Senior Year.

CLINICS.

DRS. MCNEALL, KLEIN, REPP AND JOHNSON.

The practical work afforded by the clinics is considered a highly essential part of the instruction given to the student. A student's didactic instruction will do him but little good if at the same time he is not required to put his knowledge into practice. Also, a student shows his fitness for membership in the profession chiefly by the degree of aptness which he exhibits in his practical work. The clinical training which he gets here gives him an opportunity to acquire the aptitude which is requisite for his professional work. Free clinics are held at the hospital every day from 1 to 3 o'clock P. M. The cases brought to the hospital for treatment are assigned to the senior students in alphabetical order and the students are required to prepare a full report of their examination, diagnosis, and proposed treatment and hand it to the clinician when he comes to examine the case. These reports are then graded by the clinician according to their merits. The hospital cases are assigned to the senior students who are required to treat them and keep a careful report of the case under the direction and supervision of the clinical instructors. The junior students are required to assist the seniors in their clinical and hospital work. The term grades of the students are made up from their attendance, and character of their clinical and hospital work. The clinical professor upon examination of a case or performance of an operation or administration of internal treatment gives to the students a clinical lecture upon the various aspects of the case before them. In this exhaustive way each case is made to yield the utmost good to the student. Animals of all species are brought in considerable numbers to the hospital from the surrounding excellent stock-growing territory and in this way the students come into intimate contact with a great variety of diseases, and acquire a familiarity with their treatment such as will

enable them to give good service to their clients immediately upon their entrance into practice.

FRESHMAN YEAR.

FIRST TERM.

Comparative Anatomy, 3.	(Veterinary, XXXI)
Histology, 2.	(Veterinary, XXX)
Comparative Physiology, 1.	(Veterinary, XVII)
Principles of Heredity, 2.	(Animal Husbandry, V.)
Materia Medica, 1.	(Veterinary, XXIX.)
Pharmacy, 2.	(Veterinary, XL.)
Structural Botany, 3.	(Botany, IX.)
Inorganic Chemistry, 3.	(Chemistry, I.)
Military Drill, 2.	(Military, I.)

SECOND TERM.

Comparative Anatomy, 3.	(Veterinary, XXXV.)
Histology, 2.	(Veterinary, XXXIV.)
Comparative Physiology, 1.	(Veterinary, XXXII.)
Materia Medica, 1.	(Veterinary, XXXIII.)
Pharmacy, 2.	(Veterinary XXXVII.)
Inorganic Chemistry, 3.	(Chemistry, IV.)
Poisonous Plants and Fungi, 2.	(Botany, XIV.)
Entomology, 2.	(Zoology, I.)
Military Drill, 2.	(Military, II.)

JUNIOR YEAR.

FIRST TERM.

Comparative Anatomy, 3.	(Veterinary, XXXIX.)
Comparative Physiology, 2.	(Veterinary, XXXVIII.)
Therapeutics, 1.	(Veterinary, XLIV.)
General Pathology, 3.	(Veterinary, XLIII.)
Bacteriology, 2.	(Botany, VII.)
Theory and Practice of Medicine, 3.	(Veterinary, XLV.)
Principles and Practice of Surgery, 3.	(Veterinary, XLVI.)

Clinics, 12.	(Veterinary, XLVII.)
Principles of Horse Shoeing, 1.	(Veterinary, XLI.)
Zoology, 4.	(Zoology, III.)
Organic Cremistry, 3.	(Chemistry, X.)
Military Drill, 2.	(Military, III.)

SECOND TERM.

Comparative Anatomy, 3.	(Veterinary, XLIX.)
Comparative Physiology, 2.	(Veterinary, XLVIII.)
Therapeutics, 1.	(Veterinary, XXXVI.)
General Pathology, 3.	(Veterinary, LII.)
Theory and Practice of Medicine, 3.	(Veterinary, LIV.)
Principles and Practice of Surgery, 3.	(Veterinary, LV.)
Clinics, 12.	(Veterinary, LVI.)
Principles of Horse Shoeing, 1.	(Veterinary, LI.)
Animal Parasites, 2.	(Zoology, VIII.)
Physiological Chemistry, 3.	(Chemistry, XIII.)
Military Drill, 2.	(Military, IV.)

SENIOR YEAR.

FIRST TERM.

Therapeutics, 1.	(Veterinary, LXII.)
Special Pathology, 2.	(Veterinary, LXI.)
Theory and Practice of Medicine, 3.	(Veterinary, LXIII.)
Principles and Practice of Surgery, 3.	(Veterinary, LXIV.)
Operative Surgery, 5.	(Veterinary, LXV.)
Clinics, 12.	(Veterinary, XLII.)
Sanitary Science, 2.	(Veterinary, LIX.)
Meat Inspection, 1.	(Veterinary, LVII.)
Embryology, 3.	(Zoology, V.)
Dentistry, 1.	(Veterinary, LVIII.)
Examination for Soundness, 2.	(Veterinary, LX.)

SECOND TERM.

Therapeutics, 1.	(Veterinary, LXXIII.)
Special Pathology, 2.	(Veterinary, LXXII.)
Theory and Practice of Medicine, 3.	(Veterinary, LXXV.)
Principles and Practice of Surgery, 3.	(Veterinary, LXXVI)
Operative Surgery, 5.	(Veterinary, LXXVII.)
Clinics, 12.	(Veterinary, L.)
Sanitary Science, 2.	(Veterinary, LXXI.)
Meat Inspection, 1.	(Veterinary, LXVIII.)
Milk Inspection, 2.	(Dairying, XVIII.)
Obstetrics, 2.	(Veterinary, LXX.)
Jurisprudence, 1.	(Veterinary, LXXIV.)

DIVISION OF ENGINEERING.

MECHANICAL ENGINEERING.
CIVIL ENGINEERING.
ELECTRICAL ENGINEERING.
MINING ENGINEERING.
CERAMICS.
TECHNOLOGY.

FACULTY.

W. M. BEARDSHEAR, A. M., LL. D.,
President.

GEORGE WELTON BISSELL, M. E.,
Professor of Mechanical Engineering.

ANSON MARSTON, C. E.,
Professor of Civil Engineering.

LOUIS BEVER SPINNEY, B. M. E.,
Professor of Physics and Electrical Engineering.

SAMUEL WALKER BEYER, PH. D.,
Professor of Geology and Mining.

WARREN H. MEEKER, M. E.,
Associate Professor of Mechanical Engineering.

H. J. BURT, B. C. E.,
Assistant Professor of Civil Engineering.

BURTON S. LANPHEAR, M. M. E.,
Assistant Professor of Electrical Engineering.

MISS ELMINA T. WILSON, C. E.,
Instructor in Civil Engineering.

TALBOT LENNOX,
Instructor in the Machine Shops.

EZRA C. POTTER,
Instructor in the Pattern Shop.

EDWIN CLARK BOUTELLE, B. M. E.,
Instructor in the Forge Shop and Foundry.

GORDON F. DODGE, B. M. E.,
Instructor in Free-Hand and Mechanical Drawing.

IRA A. WILLIAMS, B. Sc.,
Instructor in Geology and Mining.

E. B. TUTTLE, B. S. IN E. E.,
Instructor in Physics.

LOUIS EMANUEL YOUNG, B. M. E.,
Instructor in Mining Engineering.

EDGAR WILLIAM STANTON, M. Sc.,
Professor of Mathematics and Economic Science.

GEN. JAMES RUSH LINCOLN,
Professor of Military Science and Tactics.

ALFRED ALLEN BENNETT, M. Sc.,
Profesor of Chemistry.

MISS LIZZIE MAY ALLIS, M. A.,
Professor of French and German.

ALVIN B. NOBLE, B. PH.,
Professor of Literature and Rhetoric.

ADRIAN M. NEWENS, B. O.,
Professor of Elocution and Associate in English.

ORANGE HARRY CESSNA, B. Sc., D. D.,
Professor of History, Psychology and Ethics.

MISS MARIA M. ROBERTS, B. L.,
Instructor in Mathematics.

MISS LOLA A. PLACEWAY, B. Sc.,
Instructor in Chemistry.

MISS HAZEL LEONI BEARDSHEAR, B. L.,
Instructor in Chemistry.

MISS BESSIE B. LARRABEE, A. B.,
Instructor in English.

MISS ELIZABETH MACLEAN, M. DI.,
Instructor in English.

MISS IDA S. SIMONSON, B. L.,
Instructor in English.

ERNEST ALANSON PATTENGILL, B. S.,
Instructor in Mathematics.

MISS JULIA COLPITTS, M. A.,
Instructor in Mathematics.

MISS HELEN G. REED, PH. B.,
Instructor in English.

MISS VINA ELETHE CLARK,
Librarian.
MISS OLIVE E. STEVENS, B. L.,
Assistant Librarian.

NON-RESIDENT LECTURERS.

W. C. ARMSTRONG, B. C. E., BOONE, IOWA.,
Design and Construction of the Boone Viaduct.

W. J. KARNER, C. E., CHICAGO, ILLINOIS,
An Engineer in Great Britain.

DIVISION OF ENGINEERING.

The work of the Division of Engineering of the College is apportioned among four departments, viz:

The Department of Mechanical Engineering.
The Department of Civil Engineering.
The Department of Electrical Engineering.
The Department of Mining Engineering.

Through these departments the College offers systematic courses in Mechanical Engineering, Civil Engineering, Electrical Engineering and Mining Engineering, each leading to its appropriate degree.

These several courses are planned with a view to fitting those pursuing them to enter professional engineering work and to advance therein more rapidly than would be possible without the preparation furnished by a College course. Experience shows that the graduates from technical schools generally excel in their chosen work, and it is worthy of note in this connection that railroads*, manufactories and other corporations, as well as municipalities and government departments, are to-day demanding that those who seek promotion in their technical departments shall have secured a technical training such as can now be obtained in the engineering schools of the country.

*A prominent railway company has offered to take, each year, a graduate of the Department of Mechanical Engineering of this College as an apprentice in its motive power department.

It is very manifest that no college course in engineering can promise to a student the training and experience in all the details of his profession, because of the lack of time in the course, the multiplicity of general subjects which must be emphasized and the lack of uniformity of details in the profession due to local and personal differences which exist in the conduct of engineering work of all kinds. Moreover it seldom happens that a student in college knows definitely what specific branch of his chosen profession he will follow, and it would be folly for him to spend his time on details which he may never use. A thorough education in the branches of pure and applied science which are related to professional work is essential. Having this the engineer readily acquires familiarity with the details of his work. Without it no amount of experience with details alone can give an engineer high rank in his profession.

Therefore it is believed that a college course in engineering should be in the first place a training of the mind of the student towards ability to think logically, to observe accurately and by the application of the former acquirement to the latter to reach correct inferences; in the second place such a course should acquaint the student with approved methods of draughting and computing, with the use and limits of the instruments employed in the everyday work of his profession and should give him an opportunity for experimental work bearing upon engineering problems. In the third place such a course should provide that the student acquire the art of expressing his thoughts in good English, in public and in private, and thereby dignify himself as a member of society and his profession as a factor in the progress of the world.

In accordance with the views above expressed the engineering courses offered at this College include as a foundation a rigid and vigorous course in mathematics, pure and applied, extending through nearly four years. Parallel with the mathematics are carried, first, a course in English and French or German culminating in the seminar work of the last year; the French or German

serves the double purpose of giving access to foreign technical literature and of assisting in the English; second, a course in chemistry arranged especially with reference to engineering and industrial work; third, a course in physics, at first mainly class room work, later consisting principally of laboratory work adapted to the engineering courses and lastly, the practical or applied work peculiar to the several courses, involving draughting, designing, engineering laboratory, field or shop work and thesis.

MATHEMATICS.—The study of Mathematics begins in the Academic Year and extends through the Sophomore Year.

Advanced algebra, plane and solid geometry, plane trigonometry, analytical geometry and calculus are included in this course.

APPLIED MATHEMATICS, e. g., analytical mechanics and hydraulics, are studied in the Junior and Senior Years.

LANGUAGE AND ECONOMIC SCIENCE.—While it is admitted in a general way that in a technical course the student should direct his attention largely to studies having a direct bearing upon his specialty, yet it is believed advisable that in so far as is consistent with his other work, he should secure training in the use of the English language, and, if possible, an introduction to literature as well as modern languages and the general sciences.

To this end English is placed among the required studies in the Freshman and Sophomore Years, French or German in the Freshman Year and economic science in the Junior Year.

CHEMISTRY.—With the rapid increase in the application of both chemistry and engineering to the arts, as in electrolytic treatment of ores, the refining of metal, the manufacture of cement and in many other industrial operations, the subject of chemistry has an important place in the training of engineers.

A knowledge of Inorganic Chemistry is especially useful.

The study of Cremistry is pursued in the first and second terms of the Sophomore Year of this course.

The text-book work extends through the year and parallel thereto is a course in laboratory work, wherein the student becomes familiar with the general laboratory methods for qualitative analysis.

PHYSICS.—The course in Physics is begun in the Sophomore year. The ground of mechanics, heat, light and sound is very thoroughly covered in a course of five lectures per week throughout the year. In the Junior year the subject of electricity and magnetism is introduced by five lectures per week for one term and the engineering student begins elementary laboratory work in physical measurements. Students in mechanical engineering and electrical engineering continue work in physics to the end of the Senior Year.

PRACTICAL AND PROFESSIONAL WORK. Considerable time in the Junior and Senior Years is given by all engineering students to work having practical bearing on their profession; the object being to correlate, in some measure, theory and practice.

This work differs for the several engineering courses and is described at length in the descriptive matter of each department.

A certain amount of undergraduate work and a large amount of graduate work as well as the research carried on by the individual members of the engineering faculty is devoted to investigations which are helpful to the various industrial interests of the state.

Advanced students are given opportunity to assist in all research or commercial work which is being conducted by the engineering departments.

The several engineering departments are at all times engaged in commercial investigations and are called frequently in consultation on engineering and industrial enterprises throughout the state. Many of the results of commercial tests, special investigations and research work are published in The Iowa Engineer, a quarterly publication, issued in the interests of the engineering departments of th College.

*BUILDINGS AND EQUIPMENT.

The buildings occupied exclusively by the Division of Engineering are Engineering Hall, the Power Station, the Forge Shop and Foundry and the Pattern Shop. In addition, the Chemical-Physical Laboratory contains the headquarters and much of the equipment of the Department of Electrical Engineering.

**Morrill Hall* contains the headquarters and geological collection and Museum of the Department of Geology and Mining.

***Engineering Hall.* The third floor of this building contains the office of the Professor of Civil Engineering, a computing and instrument room, a draughting room and a large recitation room.

The second floor contains the office of the Professor of Mechanical Engineering, a computing and instrument room a blue-print room, recitation room, and two draughting rooms.

The first floor contains the office of the Associate Professor of Mechanical Engineering, a machine shop and a testing laboratory.

In the basement are located the hydraulic and the cement testing laboratories.

Power Station. This is a one story brick building 36x120, devoted to the lighting and pumping plants of the College, and to the heating plant for the engineering buildings. All of the equipment is used for purposes of instruction so far as this does not interfere with its other uses. The building contains an engine and dynamo room, a boiler room, and a pump room.

Forge Shop and Foundry. This is a one story brick building 38x78 feet, containing the equipment for instruction in forge-shop and foundry practice. The roof trusses

*In the fall of 1902, the offices, draughting and recitation rooms, museum and minor laboratories of the Division of Engineering, as well as the complete laboratories of the Department of Physics, will have uarters in the new Engineering Hall, now being erected.

**After 1902, the second and third floors of the building will be devoted to free-hand and industrial drawing.

are of steel and calculated to carry traveling cranes for transferring heavy castings and forgings.

Pattern Shop. This is a one story brick building, 38x120 feet, devoted to the work of instruction in bench work, wood turning and pattern work. A fire proof room is provided for the storage of patterns.

Locomotive Laboratory. For the temporary protection of the locomotive donated to the Department of Mechanical Engineering by the Chicago & Northwestern Railway, a corrugated iron structure has been provided.

The New Engineering Hall. There is now being erected a four story fire-proof stone building about 210 feet long by 100 feet deep for the accommodation of the offices, recitation, lecture and draughting rooms of the several engineering departments of the College.

The basement will contain the heating and ventilating apparatus and a constant temperature room.

The first story will contain the dynamo and general laboratories of department of physics; the cement and masonry laboratories of the department of Civil Engineering. The second story will contain the main offices and recitation rooms of the departments of mechanical and electical engineering and the auditorium seating 400 persons. The third story will contain the main offices, recitation and draughting rooms of the civil and mining engineering departments and the general engineering museum.

The fourth story will contain the large draughting rooms of the mechanical and civil engineering departments and blue-print and photographic laboratories. The building will be lighted, heated and ventilated by the most modern methods and will be substantially and tastefully furnished throughout.

The building will be ready for occupancy by the fall of 1902.

DEPARTMENT OF MECHANICAL ENGINEERING.

GEORGE WELTON BISSELL, PROFESSOR.

W. H. MEEKER, ASSOCIATE PROFESSOR; MR. LENNOX, MR. POTTER, MR. BOUTELLE AND MR. DODGE, ASSISTANTS.

*The headquarters of this department are in Engineering Hall, of which the first and second floors are given up to its use. The first floor is occupied by the office of the Assistant Professor of Mechanical Engineering and by the machine shops. The latter are in two rooms, having a floor space of about 3,000 square feet, one of the larger rooms having a portion screened off for a tool room.

The second floor is occupied by the office of the Professor of Mechanical Engineering, computing room, blue-print and dark room, recitation room and a large drawing room. The recitation room will seat thirty students and the drawing room has tables for fifty. Two hundred drawing boards and a large number of drawings, photographs and blue-prints constitute the equipment of the drawing room. The recitation and drawing rooms have ample blackboard space.

The basement is given up to engineering laboratory purposes, especially to experiment in hydraulics.

Besides the above space in Engineering Hall, the department occupies the Power House, the Pattern Shop, the Forge Shop and Foundry, and the Locomotive Laboratory.

The machine shops are equipped with a twenty-four by twenty-four inch planer, a milling machine, a universal grinding machine, a shaper, a drill press, two emery grinders, a polishing wheel, a power hack saw, a cutting-off machine, eight engine lathes of capacities from ten to twenty inch swing and three to ten feet between centers, and three speed and drilling lathes, together with the usual assortment of small tools in the tool room. Power is furnished to this shop by an electric motor.

*Beginning in the fall of 1902, the headquarters of the department will be in the new Engineering Hall, now being erected.

The pattern shop is a new brick building, one story high with spacious attic for storage of lumber. The building is one hundred and twenty-eight feet long by thirty-eight feet wide. A tool room twelve by twenty feet is screened off in the center. A fire-proof room is provided for patterns. The equipment of the pattern shop consists of a universal buzz-saw, a mortising machine, planer, buzz planer, band-saw, jig-saw, grindstone, fifteen turning lathes, benches for twenty students, twenty-four complete sets of small tools and a number of special tools. Power for this building is furnished by a twenty horse-power electric motor.

The forge and foundry equipments are housed under one roof in a brick building seventy-eight by thirty-eight feet. A steel truss roof structure of substantial construction provides support for an overhead traveling crane, which serves the whole floor for handling heavy ladles, castings and forgings Twelve forges, with blower and exhaust fan, drill press, vises, anvils, grindstone and small tools, such as sledges, fullers and swages, constitute the equipment for forge work.

A cupola and blower for melting cast-iron, a brass furnace, a core oven, core benches, twelve sets of moulder's tools, crucibles and a large assortment of flasks are used for foundry work. An electric motor supplies power for the forge and foundry.

The power house contains the complete electric light and pumping plants of the College, all of which is available for experimental work, and constitutes a part of the engineering laboratory equipment of the engineering departments of the College. In addition to the above the engineering laboratory equipment of the department consists of a twelve horse-power Otto gasoline engine, a five horse-power Lennox gasoline engine, a Wheeler condenser, three Worthington and two other water meters, a Holly duplex pump, injectors, weir and weighing tanks, gas meters, a Crosby steam gauge tester, fan blowers for experimental work, Westinghouse and New York air pumps, a 100,000

pound *Riehle testing machine with Gray autographic device, a 50,000 pound Olsen testing machine, an Olsen torsion testing machine, a Thurston oil tester, a complete De La Vergne refrigerating machine, gas analysis apparatus, two Thompson, two Crosby and one Richards indicators, dynamometers, a Prony brake, platform scales and other apparatus essential and accessory to experimental engineering.

Locomotive. The Chicago & Northwestern railway has presented to the Department an eight-wheel passenger locomotive and tender complete with all attachments. The locomotive will be mounted for experimental work and will be a valuable addition to the laboratory equipment.

The principal dimensions of the locomotive are as follows:

Cylinders, 16x24 inches.
Drivers, diameter, 63 inches.
Driving wheel base, 7 feet, 3 inches.
Total engine wheel base, 21 feet, 3 inches.
Total engine and tender wheel base, 42 feet, 3 inches.
Total weight of engine, 70,000 pounds.
Weight on drivers, 40,000 pounds.

Students in mechanical engineering pursue the full course in shop-work, which consists of eight hours per week for four years. Partial courses are given to the students in the agricultural, mining and electrical engineering courses.

The system of instruction in the several shops begins with graded exercises calculated to familiarize the student with tools and with the materials used. The exercises are supplanted as soon as possible by work on machines or parts thereof which are to be put into actual use. By this arrangement greater interest is maintained in the work than would be possible with a strict adherence to the exercise system. The object of the shop-work is not to teach trades, but to acquaint the student with the tools, materials

*This machine is owned and used jointly by the Departments of Mechanical and Civil Engineering.

and difficulties of shop practice and to establish in his mind principles which will aid him in designing and construction work in the other studies of his course and in his professional career.

The drawing room work begins with free-hand drawing and object drawing, and is followed successively by machine sketching, mechanical, and kinematic drawing and designing. The latter division occupies the last two years of the course.

The object sought by the drawing room course is to enable the student to make, as quickly as possible, neat and accurate working drawings, to design, in general and in detail, machines or parts thereof, and to apply throughout his knowledge of shop methods and his theoretical information acquired in the laboratory and class room.

Experimental work begins with the Junior Year and extends to the end of the course. The instruction in this subject is thorough, its scope being indicated by the following list of experiments: Tensile, transverse and compression tests of materials, properties of lubricants, measurements of power by absorption and transmission dynamometers, steam gauge and indicator spring calibration, flue-gas analysis, indicator practice, variation of engine speed, fan-blower tests, calorimetry, including throttling and separating calorimeters, weir and water meter calibration, efficiency tests of steam engines, boilers, injectors, and steam heating, electric lighting, refrigerating, power and pumping plants, and thermal analysis of the steam engine, besides a number of special experiments in the line of investigation. The engineering laboratory work usually culminates in the thesis, which is an exhaustive investigation of a limited subject. From four to five hundred hours of actual time are spent on thesis by students in the engineering courses.

Some recent theses have had the following headings:

The Effect of Clearance on the Economy of a Steam Engine.

Effect of Speed and Back Pressure on Economy of College Pump.

Economy Tests of Boiler Feed Pumps.

Investigation to Determine the Proper Division of Expenses of the College Power Plant.

Comparative Values of Iowa Coals.

All students taking shop-work or engineering laboratory are required to pay a shop fee of Five Dollars ($5.00) to defray cost of materials, power, and breakage.

In the class room the work is carried on by means of recitations and lectures, a text book and recitations being used wherever practicable; it is necessary, however, to present much material not found in text books, and in such cases recourse is had to the lecture system.

The following courses of study are given by the Department of Mechanical Engineering:

COURSE I.—*Analytical Mechanics.*—Dynamics and graphical statics. Four recitations per week, first term, Junior Year. Professor Meeker. Text-book, Mechanics of Engineering, Church. Physics III and IV and Mathematics VIII are prerequisites.

COURSE II.—*Analytical Mechanics.*—Strength of materials. Four recitations per week, second term, Junior Year. Professor Meeker. Text-book, same as for Course I. Course I required as prerequisite.

COURSE III.—*Materials of Construction.*—Three recitations per week, second term, Junior Year. Professor Meeker. Text-book, Materials of Construction, Johnson. Course XII and Chemistry III and VI required as prerequisites.

COURSE IV.—*Steam Engine.*—Theory and practical application of steam and other heat engines. Three lectures or recitations per week, second term, Junior Year. Professor Bissell. Text-book, The Steam Engine and Other Heat Engines, Ewing. Course XII, Physics III and IV and Mathematics IX are pre-requisites.

COURSE V.—*Machine Design.*—Elements, including kinematics. Three lectures per week, first term, Junior Year. Professor Bissell. Text-book, Elements of Machine De-

sign, A. W. Smith. Simultaneous work in Courses I, XII and XXIV required.

COURSE VI.—*Hydraulics.*—Four recitations per week, first term, Senior Year. Professor Meeker. Text-book, same as for Course I. Courses I and II required.

COURSE VII.—*Steam Engine Design.*—Three lectures per week, first term, Senior Year. Professor Bissell. Courses III and IV required.

COURSE VIII.—*Specifications and Contracts.*—Three lectures or recitations per week for five weeks, first term. Professor Bissell. Open to Senior engineering students in good standing.

COURSE IX.—*Constructive Engineering.*—Design and construction of heating, power, lighting and pumping plants in general and in detail. Three lectures per week, second term, Senior Year. Professor Bissell. Text-book, Kent's Hand Book. Courses IV, V, VI, VII and VIII required.

COURSE X.—*Thesis.*—The equivalent of one hour per week in the first term, Senior Year, and

COURSE XI.—*Thesis.*—The equivalent of five hours per week in the second term, Senior Year, devoted to special research on an assigned topic. Professor Bissell. Can be undertaken only by those students in the Department of Mechanical Engineering who have completed the prescribed course in Mechanical Engineering to the end of the Junior Year.

COURSE XII.—*Engineering Laboratory.*—One half day, (four hours) per week in the first term, Junior Year, and

COURSE XIII.—*Engineering Laboratory.*—One half day (four hours) per week in the second term, Junior Year. Properties of materials, calibration of instruments, valve setting and indicator practice, efficiency tests of simple machines. Professor Meeker. Text book, Experimental Engineering, R. C. Carpenter. Physics III and IV and Chemistry III and VI required as prerequisites.

COURSE XIV.—*Engineering Laboratory.*—Two half days per week in the first term, Senior Year, and

COURSE XV.—*Engineering Laboratory.*—Two half days per week in the second term, Senior Year. Efficiency tests

of stationary, locomotive and traction engines, gasoline engines, hot-air engines, boilers, refrigerating machinery, machines and complete plants. Professor Bissell. Courses IV, XII and XIII required as prerequisites.

COURSE XVI.—*Seminar.*—One hour per week in the first term and

COURSE XVII.—*Seminar.*—One hour per week in the second term, Senior Year. Written papers on assigned topics of engineering interest with discussions thereof. Professor Bissell. Juniors in Mechanical Engineering are advised to attend the Seminar.

COURSE XIX.—*Free Hand Drawing.*—Six hours per week in the first term. Mr. Dodge. Required of all Academic students who have not had the equivalent.

COURSE XX.—*Free Hand Drawing.*—Machine Sketching. Six hours per week in the second term; Mr. Dodge. Required of all engineering students in the Academic Year. Course XIX or its equivalent required as prerequisite.

COURSE XXI.—*Mechanical Drawing.*—Elementary; the use of instruments and practice in lettering. Six hours per week in the first term, Freshman Year. Mr. Dodge. Courses XIX and XX, or their equivalent required as prerequisites.

COURSE XXII.—*Mechanical Drawing.*—Working drawings, tracings and blue-prints of machine details. Six hours per week in the first term, Sophomore Year. Professor Meeker and Mr. Dodge. Course XXI required as prerequisite.

COURSE XXIII.—*Mechanical Drawing.*—Working drawings, tracing and blue-prints of complete machines. Six hours per week in the second term, Sophomore Year. Professor Meeker. Course XXII required as prerequisite.

COURSE XXIV.—*Designing.*—Six hours per week in the first term and

COURSE XXV.—*Designing.*—Three hours per week in the second term, Junior Year. Mechanical movements, gearing, slide valve work and design of simple machines.

Professor Bissell and Mr. Dodge. Text-books, Kinematic Drawing, Williams, and Slide Valve Gears, Halsey.

COURSE XXVI.—*Designing.*—Six hours per week in the first term and

COURSE XXVII.—*Designing.*—Six hours per week in the second term, Senior Year. Designing of steam engines, boilers and machine tools. Professor Bissell. Text book, Kent's Hand Book. Courses I. II, IV, V, XXIV, XXV required as prerequisites.

COURSE XXVIII.—*Mining Machinery.*—Two lectures per week for the last ten weeks of the second term. This course is arranged especially for the Review Course in Mining Engineering, and will deal with the application of steam to mining operations.

COURSE XXIX.—*Shop-Work.*—Bench-work, wood carving and turning. Eight hours per week for one term. Mr. Potter.

COURSE XXX.—*Shop-Work.*—Forge-work; forging and welding iron and steel, dressing and tempering tools. Eight hours per week for one term. Mr. Boutelle. Course XXIX required.

COURSE XXXI.—*Shop-Work.*—Pattern work, making patterns and core-boxes for iron and brass castings. Principles of shrinkage, draft and allowance for finish. Eight hours per week for one term. Mr. Potter. Courses XXIX and XXXII required.

COURSE XXXII.—*Shop-Work.*—Foundry work. Moulding and casting of iron and brass. Green and dry sand, cores, venting, gating, mixtures and alloys. Eight hours per week for one term. Mr. Boutelle. Course XXIX required as prerequisite.

COURSE XXXIII.—*Shop-Work.*—Eight hours per week for one term,

COURSE XXXIV.—*Shop-Work.*—Eight hours per week for one term,

COURSE XXXV.—*Shop-Work.*—Eight hours per week for one term, and

COURSE XXXVI.—*Shop-Work.*—Eight hours per week for one term. Use of hand and machine tools, finishing, grinding and assembling of machines and parts thereof. Mr. Lennox. Courses XXIX, XXX, XXXI and XXXII required as prerequisite.

COURSE XXXVII.—*Shop-Work.*—Wood work; four or eight hours per week for one term. Mr. Potter. Open to students in the Division of Agriculture.

COURSE XXXVIII.—*Shop-Work.*—Forge work; four or eight hours per week for one term. Mr. Boutelle. Open to students in the Division of Agriculture.

COURSE XXXIX.—*Modern Machine Shop Practice.*—One lecture per week to students who are taking Courses XXXIII and XXXIV.

COURSE XL.—*Dairy Machinery.*—One lecture per week first term. Mr. Lennox. Open to students in the Division of Agriculture.

MECHANICAL ENGINEERING.

ACADEMIC YEAR.

FIRST TERM.

Algebra, 5.	(Mathematics, I.)
English, 5.	(English, I.)
History, 5.	(History, I.)
Elocution, 2.	(Elocution, I.)
Drawing, 2.	(Mechanical Engineering, XIX.)

SECOND TERM.

Algebra, 5.	(Mathematics, II or III.)
Plane Geometry, 5.	(Mathematics, V.)
Elementary Rhetoric, 5.	(English, II.)
History, 3.	(History, II.)
Drawing, 2.	(Mechanical Engineering, XX.)

FRESHMAN YEAR.

FIRST TERM.

Advanced Algebra, 5.	(Mathematics, IV.)
French, 5, *or*	(Languages, I.)

German, 5. (Languages, V.)
Advanced Rhetoric, 5. (English, III.)
Shop-work, 2. (Mechanical Engineering, XXIX.)
Mechanical Drawing, 2. (Mechanical Engineering, XXI.)
Military Drill, 2. (Military, I.)
Library Work, 4 hours. (Library, I.)

SECOND TERM.

Solid Geometry and Plane Trigonometry, 5. (Mathematics, VI.)
French, 5, *or* (Languages, II.)
German, 5. (Languages, VI.)
Composition, 1. (English, IV.)
Descriptive Geometry, 5. (Civil Engineering, IV.)
Shop-work, 2. (Mechanical Engineering, XXX.)
Military Drill, 2. (Military, II.)
Library Work, 4 hours. (Library, II.)

SOPHOMORE YEAR.

FIRST TERM.

Analytical Geometry, 5. (Mathematics, VIII.)
Physics, 5. (Physics, III.)
Chemistry, 5. (Chemistry, III.)
Shop-work, 2. (Mechanical Engineering, XXXI.)
Mechanical Drawing, 2. (Mechanical Engineering, XXII.)
Composition, 1. (English, V.)
Military Drill, 2. (Military, III.)

SECOND TERM.

Calculus, 5. (Mathematics, IX.)
Physics, 5. (Physics, IV.)
Chemistry, 5. (Chemistry, VI.)
Shop-work, 2. (Mechanical Engineering, XXXII.)
Mechanical Drawing, 2. (Mechanical Engineering, XXIII.)
Composition, 1. (English, VI.)
Military Drill, 2. (Military, IV.)

JUNIOR YEAR.

FIRST TERM.

Analytical Mechanics, 4. (Mechanical Engineering, I.)
Political Economy, 5. (Economic Science, I.)
Electricity and Magnetism, 3. (Physics, VI.)
Machine Design, 3. (Mechanical Engineering, V.)
Physical Laoratory, 1. (Physics, XIV.)
Engineering Laboratory, 1. (Mechanical Engineering, XII.)
Designing, 2. (Mechanical Engineering, XXIV.)
Shop-work, 2. (Mechanical Engineering, XXXIII.)
*Debating, 1. (English, VII.)

SECOND TERM.

Analytical Mechanics, 4. (Mechanical Engineering, II.)
Materials of Construction, 3. (Mechanical Engineering, III.)
Dynamo Electric Machinery, 4. (Physics, X.)
Physical Laboratory, 2. (Physics, XVII.)
Engineering Laboratory, 1. (Mechanical Engineering, XIII.)
Designing, 1. (Mechanical Engineering, XXV.)
Steam Engine, 3. (Mechanical Engineering, IV.)
Shop-work, 2. (Mechanical Engineering, XXXIV.)
*Debating. 1. (English, VIII.)

SENIOR YEAR.

FIRST TERM.

Steam Engine Design, 3. (Mechanical Engineering, VII.)
Hydraulics, 4. (Mechanical Engineering, VI.)
Designing, 2. (Mechanical Engineering, XXVI.)
Engineering Laboratory, 2. (Mechanical Engineering, XIV.)
Shop-work, 2. (Mechanical Engineering, XXXV.)
Physical Laboratory, 2. (Physics, XX.)
Specifications and Contracts, 1. (Mechanical Engineering, VIII.)

*Elective, subject to the approval of the Professor of Mechanical Engineering.

Seminar, 1. (Mechanical Engineering, XVI.)
Thesis, 1. (Mechanical Engineering, X.)

SECOND TERM.

Constructive Engineering, 3. (Mechanical Engineering, IX.)
Hydraulic Engineering, 2. (Civil Engineering, XXII.)
Designing, 2. (Mechanical Engineering, XXVII.)
Engineering Laboratory, 2. (Mechanical Engineering, XV.)
Seminar, 1. (Mechanical Engineering, XVII.)
Thesis, 5. (Mechanical Engineering, XI.)

DEPARTMENT OF CIVIL ENGINEERING.

ANSON MARSTON, PROFESSOR.

H. J. BURT, ASSISTANT PROFESSOR; MISS WILSON, ASSISTANT.

On the completion of the New Engineering Hall the Civil Engineering Department will have its headquarters in that building. At present it occupies the third story of the present Engineering Hall, besides considerable laboratory space in the rooms of the Mechanical Engineering Department in the first story. Its hydraulic and cement testing laboratories are located in the basement of the present Engineering Hall. The rooms in the third story include a class-room with seats for 60 students, a well-lighted drafting room, with drawing stands for forty students and boards for 120; an instrument and computing room, and the office of the Department.

The Instrumental Equipment includes five complete engineer's transits, one plain engineer's transit, one plane table, one surveyor's compass, one railroad compass, four traverse tables, four engineer's levels, and numerous chains, tapes, rods, etc. The Department is also well supplied with minor instruments such as drawing instruments, field glasses, computing machines, planimeter, etc .

The Laboratory Equipment includes stone sawing and grinding machinery, a drying oven, an abrasion testing machine, a standard rattler for paving brick tests, a micro-

scope, various balances, etc. In conjunction with the Mechanical Engineering Department the Civil Engineering Department owns an automatic and autographic Riehle Testing machine of 100,000 pounds capacity for crushing, tensile and transverse tests of steel, iron, wood, stone and paving brick. Students also have access to other testing machines. The Department possesses a complete cement testing outfit, consisting of a Fairbank's Testing Machine, a mixing slab, many briquette moulds, cement and sand sieves, bath, etc.

A Hydraulic Laboratory has been fitted up in the basement of the present Engineering Hall. Water is supplied by about 700 feet of 8 inch and 10 inch cast iron pipe from the College elevated tank, of 163,000 gallons capacity. The available head is about 150 feet. Arrangements are made for measuring the loss of head from friction in the supply pipe and in its special castings. In the laboratory a tank is provided 50 feet long by 6 feet wide and 4 feet deep, which is used as a measuring and discharging tank for the various pieces of apparatus, and which can also be used for experiments on the resistance of models to propulsion. The water is removed from this tank by two sewers; one 6 inches and the other 15 inches in diameter. These are arranged to be used for experiments on the laws of flow in sewer pipes. The laboratory is also provid with pipes of different sizes so arranged that measurements of the friction losses in these pipes and in their fittings can be made. Additional apparatus in the nature of hydraulic motors, pumps of various types, and apparatus for experiments with orifices is still to be provided.

Other Equipment. The Department has a good collection of blue print plans of bridges, roof trusses, buildings, and other engineering structures and apparatus of all kinds. Additional plans and cuts are constantly being obtained as opportunity offers; lantern slides of many of these cuts and plans have been prepared for use in the class room.

The Department possesses a set of full sized sections of the wrought iron and steel shapes commonly used in engineering structures.

The Department has a collection of specimens of brick building stone, and other building materials and of paving brick.

WATER WORKS AND SEWAGE DISPOSAL PLANT.

This Department designed and supervised the construction of the College water works. The College water tower is the largest in the west. It was designed with special reference to its architectural appearance, and cuts of it have been published in the recent books treating of the design of such structures. The pumping machinery, which is of an unusual and very efficient type, is so arranged that college students in water works engineering can make tests of the efficiency of the apparatus as part of the class work.

The Department has also designed and supervised the construction of the College Sewage Disposal System. This is the first purification plant installed in the state, and has been very successful. Investigations in the line of the most recent advances in sewage purification are now being conducted with the college plant, and the college is also studying the operation of similar plants elsewhere. It is hoped that the results of these investigations will be of much value to Iowa cities in the future. In this work the Departments of Agricultural Chemistry and of Botany cooperate.

The water works system and the sewage disposal system are utilized so far as possible to furnish practical object lessons to the students in Hydraulic and Sanitary Engineering.

EXPERIMENTAL INVESTIGATIONS HELPFUL TO STATE INTERESTS.

The modern university or school of technology must serve the public in many other ways than by giving class

instruction to students. Experimental and other investigations on important subjects must be carried on, and the results of these as well as other important or recent truths of advanced thought, or theoretical or applied science, must be made known to the general public as well as to the institution's own students.

Realizing this, the Department of Civil Engineering is doing what it can to advance the interests of the State of Iowa by carrying on investigations helpful to state interests. One of the most important lines of work already begun is the testing of the properties of the building materials and paving brick of the state. During the past year several thousand tests of paving brick and of dry press brick manufactured and used in Iowa, have been made. The results of this work are quite important and it is hoped that when they are published they will assist to make the properties of Iowa building materials and paving brick better known, and so increase their use. The results will shortly be published and widely distributed by the college, and are afterwards to be republished by the State Geological Survey.

In connecton with this work the Department of Mining Engineering is co-operative by making equally extensive tests and investigations of the clays from which the brick tested by the Civil Engineering Department were made. It is to be hoped that the new building for work in Ceramics can soon be erected. In this building the Departments will have a joint laboratory well equipped for such investigations. Until this building is erected this work will be provided for in the new Engineering Hall now in process of construction.

The Department hereby extends an invitation to the Clay Workers and to the quarry owners of the State of Iowa to send their products to it for the carrying out of any tests they may wish to be made. Such tests will be made at the actual cost of the extra labor required to carry them out. No charge will be made for the use of the

apparatus nor for the supervision of the work by the regular officers of the Department. A similar invitation is extended to municipal authorities, engineers, manufacturers and others who may wish to have tests of materials made.

A set of tests of the gypsum products of the state is being begun for the State Geological Survey, and another for the manufacturers themselves will probably be undertaken later.

It is the purpose of the Department to assist in every possible way in the development of the enginering industries of the State of Iowa, and communications are invited from manufacturers, municipal authorities, officers in charge of transportation interests, or engineers throughout the state who may desire to make use of the facilities at the command of the Department.

The experiments now in progress with the College Sewage Disposal system already mentioned, constitute a line of work which will be very helpful to state interests, for many of our cities will in the near future find themselves compelled to cease polluting the streams of the state with their unpurified sewage. There is a wide movement in Iowa at the present time to construct sewer systems for our cities, and in a large percentage of cases no suitable outlet into a sufficiently large body of water is available. Hence sewage disposal systems are destined to special importance in this state. Already the college has published a bulletin giving the results with the college plant, and has distributed it throughout the state. Other bulletins will follow. Already the college is receiving numerous inquiries regarding this subject, not only from towns within the state, but from others scattered throughout the whole country.

Some of the experimental thesis work by students of the Department has been of value in furnishing information useful to state interests and to engineers. A few years ago two students made gaugings of the flow of sewage from the sewers of Des Moines, giving information

which has since been published in more than one book on Sanitary Engineering. In one of the thesis investigations made in 1898 nearly 200 photographs were taken, from which the exact numbers of fire streams from hose nozzles under different conditions have been mapped out, giving information of value to Hydraulic Engineers. In another recent thesis investigation a magnetic survey of Story County has been made, showing before unnoticed variations in the isogonic lines. This work is being extended to an adjoining county the present year.

The Department hopes to be able to make investigations along the line of Iowa good roads in the near future.

COURSE OF STUDY.

One of the most eminent of American engineers has said, "The Civil Engineer of the new epoch must be an educated man. In no profession will this be more necessary." The work of the course of study in Civil Engineering has been arranged to give as thorough a training as practicable in those fundamental subjects, a knowledge of which must form the foundation of the equipment of the competent Civil Engineer. The work may be classified under the heads, Culture Studies, Mathematical Studies, Science Studies, and Professional Studies.

Culture studies include History, English, French or German, and Political Economy. Thorough work in English is specially necessary in the training of the engineer to enable him to express himself with the utmost clearness and conciseness, in his reports and in papers on technical subjects. No one can attain much success as an engineer who fails in these particulars. His success in carrying out projects upon which he is engaged will often depend on his ability to convince his superiors or public officials of the correctness of his views. The really successful engineer also must come into close contact with other members of his profession, and must exchange information of

value with them through the medium of papers on technical subjects. For the attainment of these ends the engineer should give special attention to the thoroughness of his training in English. The work in English begins in the Academic year and continues to the end of the Sophomore year. Much training in the writing of essays is given and the last three terms are devoted wholly to this kind of work, which is of special importance to the engineer. A course in debating is offered throughout the Junior year which all students who can do so are advised to elect. It is of importance to the engineer to be able to express himself creditably orally as well as in writing. The drill in English is continued to some extent throughout the Junior and Senior years by the work in the Engineering Seminar, which requires a careful preparation of papers on professional subjects.

The work in pure *mathematics* continues throughout the Academic, Freshman and Sophomore years, and includes thorough instruction in Algebra, Plane and Solid Geometry, Plane and Spherical Trigonometry, Analytical Geometry and Calculus. Thorough preparation in mathematics is one of the most essential things in an engineer's education, and without it he can never pass beyond the mere workman stage in his profession. It is specially necessary that he should be able to apply his knowledge of mathematics with facility to the actual problems he encounters in his professional work. Hence the instruction in mathematics is specially directed to giving facility in the solution of problems. The work in pure mathematics is supplemented in the Freshman year by a course in Descriptive Geometry, which gives the application of mathematics to draughting, and in the Junior and Senior years by thorough courses in Analytical Mechanics, Strength of Materials and Hydraulics, which give the mathematical applications of physical laws to the designing of engineering structures and to the study of the laws

of liquids. Practical Astronomy is studied in the second term of the Senior year.

The successful engineer must also be thoroughly familiar with the scientific principles relating to the laws and forces of nature which he must use in his professional work. Instruction in the *physical sciences* begins with Chemistry and Physics in the Sophomore year. Electricity and Magnetism are taught in the Junior year, and Geology in the Senior year. The College laboratories are specially well fitted for giving training in scientific work. It is by a study of scientific subjects supplemented by laboratory work that the engineer becomes familiar with those sources of power in nature which it is his life work to direct for the use and convenience of man.

For detailed information as to the nature of the *professional work given in the course in Civil Engineering* the reader is referred to the statements regarding each specific subject under the head of "Courses" below. It may be said here in a general way that the instruction in Free Hand Drawing begins in the Academic year. Mechanical Drawing, Lettering, the use of Water Colors and Pen Topography are studied in the Freshman year. Shades and shadows and perspective are studied in the Sophomore year. In the course of instruction in Drawing it is attempted to give the student such facility in drawing that he can do creditable work in an engineering drafting office. Especial attention is paid to the lettering of all drawings both in the direct class work in drawing and in the finishing up of all other drawings made in connection with his other professional work. The student is required to letter them plainly and neatly and to make finished plates. Throughout the Sophomore, Junior and Senior years the student has practice in the preparation of maps and of drawings and plans of various engineering structures.

The work in Field Surveying practice begins in the Freshman year and continues for three years, seven hours

per week for fourteen weeks of each term. The student serves in a subordinate position until he becomes familiar with the instruments and the work, and finally he has charge of a small party. He becomes familiar with land surveying, leveling, topographical surveying and railway surveying by actual work in the field. It is the aim of the course to give the student the facility in the handling of instruments and in the carrying out of operations in field surveying which can only be acquired by considerable practice. It is also attempted to give him as much experience as possible in the handling of small parties of men. Besides the above work students actually camp in the field for two weeks and a half in each of three summer vacations, and so become familiar with topographical work on a more extended scale. In lieu of this summer surveying many students obtain remunerative work with engineers throughout the summer vacation. Such work, when properly certified to by the engineer under whom it is taken, is accepted in lieu of the summer camp surveying. Students are encouraged and urged to secure positions of this kind, as it not only assists them financially, but also is of great benefit to them in connection with their professional training.

A course of instruction in land and topographical surveying runs throughout the Sophomore year, and one in railway engineering runs throughout the Junior year.

Instruction in roads and pavements is given in the second term of the Junior year. Sanitary Engineering, Water Works Engineering, Bridge Engineering and Masonry Structures and Foundations are taught in the Senior year. For the details of each of these courses reference should be made to the information given below under the specific course named. The designing of engineering structures by the student begins in the second term of the Junior year and continues throughout the Senior year. In this work the student actually designs roof trusses and stone and steel truss bridges, preparing the working

drawings. A course of actual practice in testing the various materials of construction in the Engineering Laboratory, is given in the Junior and Senior years, and is of great value in familiarizing the student with methods of testing and with the properties of the materials of construction.

A valuable part of the work of the course is not laid out on paper, but is gained by inspection of engineering works on the inspection tours arranged for the upper classmen. It is planned at least once each year to have the Junior and Senior students go on an inspection trip to some point where various engineering works can be inspected and their instructive features noted.

Valuable instruction is also obtained by listening to the lectures given by non-resident lecturers. Practicing Engineers are invited to the College to give lectures to the Engineering students upon the subjects in which they are experts. During the past year such lectures have been given by Mr. Armstrong, C. E., who is in charge of the construction of the Chicago & Northwestern Railway viaduct over the Des Moines river, the largest double track viaduct in the world. Another lecture was given to the Engineering students by Mr. W. J. Karner, Assistant to the Chief Engineer of the Illinois Central Railroad. It is planned to have at least two such lectures for the Civil Engineering Department each year, and the other engineering departments also arrange for non-resident lecturers.

The work of the course finally culminates in the thesis an original investigation carried on by the students to demonstrate his ability to do such work before he graduates. In the past large amounts of time have been devoted by students as a rule to this work, and it has often been the case that the results have been found worthy of publication. Each student should attempt to make his thesis one of the things of which he can justly be proud throughout the remainder of his professional career.

The following courses of study are given by the Civil Engineering Department:

COURSE I.—*Lettering.*—Three hours per week throughout the first term, Freshman year. Text-book, Reinhardt's "Lettering for Draughtsmen, Engineers and Students." The work consists in the preparation of practice plates of lettering and titles, and in actual practice in lettering engineering drawings. Miss Wilson.

COURSE II.—*Field Work.*—Seven hours per week for fourteen weeks during the first term, Freshman year. See Course III. Professor Marston, Professor Burt, Miss Wilson.

COURSE III.—*Field Work.*—Seven hours per week for fourteen weeks during the second term, Freshman year. In Courses II and III the men are assigned to do duty as chainmen, axemen and rodmen in the squads in Sophomore Surveying and Junior Railway Surveying, of which Sophomores and Juniors have charge, besides serving as instrument men. Professor Marston, Professor Burt and Miss Wilson.

Note.—The work of Courses II and III is preparatory to the Field Work of the Sophomore and Junior Years, which takes the same number of hours per week each year. Thus the student has the training to be obtained by three years actual practice in the field. He begins in a subordinate position, but for a part of the time is in responsible charge of a small party.

COURSE IV.—*Descriptive Geometry.*—Four recitations and three hours drawing per week throughout the second term, Freshman Year. Text-book, MacCord's "Descriptive Geometry." Many original problems are also solved in class and in the draughting room. This course is open to students who have completed Mechanical Drawing, Plane Geometry, and second term Academic Algebra, and who are taking a simultaneous course in Solid Geometry and Trigonometry. Professor Marston and Miss Wilson.

COURSE V.—*Drawing. Tinting and Shading and Pen Topography.*—Six hours per week throughout the second term, Freshman Year. The work consists in practice with water colors (occupying about one-half of the total time), and of making practice plates illustrating the use of topographical symbols, contours and hatchings, during the remainder of the time. This course is open to the students who have completed Free Hand Drawing. Miss Wilson.

COURSE VI.—*Drawing. Shades and Shadows and Perspective.*—Three hours per week throughout the first term, Sophomore Year. See Course VII. Miss Wilson.

COURSE VII.—*Drawing. Shades and Shadows and Perspective.*—Three hours per week throughout the second term, Sophomore Year. For Courses VI and VII the text-books are Miss Wilson's Notes and Lawrence's "Principles of Perspective." The drawing consists partly in the solution of problems in Shades and Shadows (shading with India ink), partly in the solution of problems and in simple exercises in Perspective, and partly in the preparation and architectural rendering of a perspective drawing of a building or engineering structure, from the detailed plans. This course is open to students who have completed Descriptive Geometry, Mechanical Drawing and Tinting and Shading. Miss Wilson.

COURSE VIII.—*Surveying.*—Two recitations and seven hours field work per week throughout the first term, Sophomore Year, in the Civil Engineering Course, and throughout the first term, Junior Year, in the Agricultural Course and in the Course in Science. Text-book, Hodgman's "Land Surveying." The topics treated in the class room work are the use and care of surveying instruments, mathematical problems in surveying, including methods for calculating the areas of tracts of land, the legal and mathematical principles of Land Surveying, the best methods of doing field work and keeping records in Land Surveying, the study of Drainage Surveying and the making of plats and profiles. The field work, which occupies

seven hours each week for fourteen weeks, begins with practice in the use and adjustment of surveying instruments, followed by practice in leveling and in the preparation of profiles. After this the students go to the County Seat, and copy from the County Surveyor's books the records relating to some tract of land near the College. They then survey this tract, relocating all missing corners and setting others where required, and obtaining all data necessary for constructing an accurate and complete plat. The construction of this plat finishes the term's work. This course is open to students who have completed Geometry and Plane Trigonometry. Professor Burt and Miss Wilson.

COURSE IX.—*Surveying.*—Two recitations and seven hours field work per week throughout the second term, Sophomore Year. Text-book, Johnson's "Theory and Practice of Surveying." The topics treated in the class room work are Topographical Surveying, Hydraulic Surveying, Mining Surveying, City Surveying and Geodetic Surveying. The field work, which occupies seven hours per week for fourteen weeks, consists mainly in obtaining the necessary data in the field and then in constructing an accurate map of a tract containing about 160 acres, showing the contours and other topographical features. This course is open to students who have completed Course VIII. Professor Burt and Miss Wilson.

COURSE X.—*Railway Engineering.*—Three recitations and seven hours of field work per week throughout the first term, Junior Year. See Course XI. For one of the recitations three hours office work are substituted part of the term. Professor Marston.

COURSE XI.—*Railway Engineering.*—Three recitations and seven hours field work per week, throughout the second term, Junior Year. For one of the recitations three hours office work are substituted during part of the term.

For Courses X and XI the text-books are Searle's "Field Engineering," Crandall's "Transition Curves," Tratman's "Railway Track and Track Work," and Professor

Marston's Notes. In the Notes, practical details of railroad location and construction are given, standard plans for railway structures are given and discussed, and the economic theory of railway location is treated at some length. In the text-books some of the topics are simple, compound and transition curves, the location and construction of railways, track standards and maintenance, etc. In the field work a preliminary survey of about two miles of railway is made, from which a contour map is prepared. On this a "paper location" is laid down, after a careful study to determine the best route. This located line is then run in the field and cross sectioned. The grading is calculated, bills of material for culverts and bridges are made, bridges are staked out, and the cost of the line is estimated. This course is open to students who have completed Geometry, Plane Trigonometry, and Courses VIII and IX. Professor Marston.

COURSE XII.—*Roads and Pavements.*—Two recitations throughout the second term, Junior Year, in the Courses in Civil Engineering and Agriculture. Text-books, Spalding's Roads and Pavements, and Byrne's Highway Construction. Among the topics studied are the good roads problem, the best methods of constructing country roads, city streets and grades, classes and methods of construction of pavements, and the costs of roads and pavements. Professor Marston.

COURSE XIII.—*Designing, Structural.*—Six hours per week throughout the second term, Junior Year. Text-book, Johnson's "Framed Structures." The work consists in actually designing one or more roof trusses of a plate girder bridge, including calculating the stresses, the sizes of the members and the riveting, and in preparing working plans, bills of material and estimates of weights. This course is open to students who have completed the first term Junior work in Analytical Mechanics, and are pursuing simultaneously the second term Junior work in the same subject. Professor Burt.

COURSE XIV.—*Engineering Laboratory.*—Six hours per week throughout the second term, Junior Year. The work is done in the testing laboratories, and consists in making the various standard tests of the materials of construction, including cement, building stone, paving brick, wood, cast iron, wrought iron, and steel. This course is open to Juniors. Miss Wilson.

COURSE XV.—*Engineering Laboratory.*—Three hours per week throughout the first term, Senior Year. The work consists in experiments in the Hydraulic Laboratory, such as gaging the flow of water over weirs, through orifices and in sewer pipes, measuring the friction in pipes, and testing the efficiency of pumps and hydraulic motors. This Course is open to Seniors who are at the same time studying hydraulics. Miss Wilson.

COURSE XVI.—*Engineering Laboratory.*—Three hours per week throughout the second term, Senior Year. The work consists of special investigations in the hydraulic or testing laboratory on subjects selected after consultation with the instructor. This Course is open to students who have completed Courses XIV and XV. Miss Wilson.

COURSE XVII.—*Framed Structures.*—Five recitations per week throughout the first term, Senior Year. Text-book, Johnson's "Framed Structures," The work consists in the study of the methods for computing the stresses and making the design of bridge and roof trusses and other framed structures. Many numerical problems are worked out. This course is open to students who have completed Mechanics. Professor Burt.

COURSE XVIII.—*Framed Structures.*—Two recitations per week throughout the second term, Senior Year. Text-book, Johnson's "Framed Structures." This course is open to students who have completed Course XVII, of which it is a continuation. Professor Burt.

COURSE XIX.—*Designing.*—Twelve hours per week throughout the second term, Senior Year. Text-book, Johnson's "Framed Structures." The work consists in actually designing a steel or iron railway or highway

bridge, including the calculation of the stresses, the computation of the sizes of members, the riveting, etc., and the making of the detailed plans, estimating the weights, and preparing bills of materials. This course is open to students who have completed Course XVII. Professor Burt.

COURSE XX.—*Stereotomy.*—Six hours per week throughout the first term, Senior Year. Text-book, Crandall's "Stereotomy." The work consists in actually designing a stone, brick, concrete or Melan arch bridge. This course is open to students who have completed Mechanics. Professor Marston.

COURSE XXI.—*Sanitary Engineering.*—Three recitations per week throughout the first term, Senior Year. Text-book, Folwell's "Sewerage," and Professor Marston's Notes. The work consists in the study of the principles and methods involved in the design, construction and maintenance of sewerage systems. House plumbing and sewage disposal are studied in the Notes. Professor Marston.

COURSE XXII.—*Hydraulic Engineering.*—Three recitations per week throughout the second term, Senior Year, on the principles and methods involved in the design, construction and maintenance of water works system. Text-book, Folwell's "Water Supply Engineering," supplemented by notes. Professor Marston.

COURSE XXIII.—*Masonry Structures.*—Four recitations per week throughout the second term, Senior Year. Text-book, Baker's "Masonry Structures." The work consists in the study of the principles involved in the design and construction of foundations, and in the design, construction and maintenance of all classes of masonry structures. Professor Marston.

COURSE XXIV.—*Practical Astronomy.*—Two recitations and three hours field work per week, second term, Senior Year. Required, Mathematics VII and IX.

The work covers the ordinary methods of determining latitude, longitude and time, with their application to Geodetic Surveying. Professor Burt.

COURSE XXV.—*Thesis.*—Credit equivalent to one recitation per week throughout the first term, Senior Year, is given for the thesis work required during that term. See Course XXVI. Professor Marston.

COURSE XXVI.—*Thesis.*—Credit equivalent to three recitations per week throughout the second term, Senior Year, is given for the thesis work required that term. The credits for thesis, Courses XXV and XXVI, require at least three hours per week thesis work throughout the first term, Senior Year, and nine hours per week throughout the second term, Senior Year. Students are required to put in as much additional time as may be necessary to thoroughly work up the subject chosen, and to prepare a well-digested and complete write-up of the results. Most students devote much extra time to the work. The subject chosen must be one requiring original work. It may be the study and design of some engineering project (including the surveys), the investigation of some engineering question, or an experimental investigation. Professor Marston.

COURSE XXVII.—*Engineering Seminar.*—Credit is given equivalent to one recitation per week, first term, Junior Year. See Course XXX. Professor Marston.

COURSE XXVIII.—*Engineering Seminar.*—Credit is given equivalent to one recitation per week, second term, Junior year. See Course XXX. Professor Marston.

COURSE XXIX.—*Engineering Seminar.*—Credit is given equivalent to one recitation per week, first term, Senior Year. See Course XXX. Professor Marston.

COURSE XXX.—*Engineering Seminar.*—Credit is given equivalent to one recitation per week, second term, Senior Year.

The Civil Engineering Seminar, Courses XXVII to XXX, inclusive, meets once each week, while College is in session, and has for its members the Professors and the Instructor in Civil Engineering, and all students in the Junior and Senior classes in the course in Civil Engineering. At each meeting four students give "journal reviews"

of the most timely articles and topics found in the current numbers of the technical journals, a large number of which are regularly taken by the College Library. Another student then reads a paper on some engineering subject. Both the journal review and the paper are discussed by the other members of the Seminar. The subjects for the papers follow a regular, connected program, arranged in advance for each term. Professor Marston.

COURSE XXXI.—*Summer Surveying.*—Fifteen entire days' work in the field in the summer vacation following the Freshman Year. See Course XXXIII. Professor Marston and Professor Burt.

COURSE XXXII.—*Summer Surveying.*—Fifteen entire days' work in the field in the summer vacation following the Sophomore Year. See Course XXXIII. Professor Marston and Professor Burt.

COURSE XXXIII.—*Summer Surveying.*—Fifteen entire days' work in the field in the summer vacation following the Junior Year.

In the work of Courses XXXI to XXXIII, inclusive, the Professors of Civil Engineering and the students in the Course in Civil Engineering go into camp for two and one-half weeks each summer vacation, beginning the day after Commencement, and conduct an organized topographical survey of some region in the state. Each year's work continues that of the preceding year, until a large area is mapped. At present a strip about three miles wide, half on each side of the Des Moines river, south of Boone, is being mapped. Lower classmen will serve in subordinate positions. Upper classmen will have responsible charge of parties, and will do the triangulating and final mapping. All camp equipage, including tents and cooking utensils, will be furnished by the College. Students must pay their own traveling and living expenses. Professor Marston and Professor Burt.

COURSE IN CIVIL ENGINEERING.

ACADEMIC YEAR.

FIRST TERM.

Algebra, 5.	(Mathematics, I.)
English, 5.	(English, I.)
History, 5.	(History, I.)
Elocution, 2.	(Elocution, I.)
Drawing, 2.	(Mechanical Engineering, XIX.)
*Field Work, 2.	(Civil Engineering, II.)

SECOND TERM.

Algebra, 5.	(Mathematics, II or III.)
Plane Geometry, 5.	(Mathematics, V.)
Elementary Rhetoric, 5.	(English, II.)
History, 3.	(History, II.)
Drawing, 2.	(Mechanical Engineering, XX.)
*Field Work, 2.	(Civil Engineering, III.)

FRESHMAN YEAR.

FIRST TERM.

Advanced Algebra, 5.	(Mathematics, IV.)
French, 5, *or*	(Languages, I.)
German, 5.	(Languages, V.)
Advanced Rhetoric, 5.	(English, III.)
Mechanical Drawing, 2.	(Mechanical Engineering, XXI.)
Lettering, 1.	(Civil Engineering, I.)
**Field Work, 2.	(Civil Engineering, II.)
Military Drill, 2.	(Military, I.)
**Shop Work, 2.	(Mechanical Engineering, XXIX.)
Library Work, 4 hours.	(Library, I.)

SECOND TERM.

Solid Geometry and Plane Trigonometry, 5.	(Mathematics, VI.)
French, 5, *or*	(Languages, II.)

*Optional.

**Students who have completed Field Work can elect shop work.

German, 5. (Languages, VI.)
Composition, 1. (English, IV.)
Descriptive Geometry, 5. (Civil Engineering, IV.)
Drawing, 2. (Civil Engineering, V.)
**Field Work, 2. (Civil Engineering, III.)
Military Drill, 2. (Military, II.)
**Shop Work, 2. (Mechanical Engineering, XXXIII.)
Library Work, 4 hours. (Library, II.)
***Summer Surveying, 2 1-2 weeks.
(Civil Engineering, XXXI.)

SOPHOMORE YEAR.

FIRST TERM.

Analytical Geometry, 5. (Matnematics, VIII.)
Physics, 5. (Physics, III.)
Surveying, 4. (Civil Engineering, VIII.)
Chemistry, 5. (Chemistry, III.)
Drawing, 1. (Civil Engineering, VI.)
Composition, 1. (English, V.)
Military Drill, 2. (Military, III.)

SECOND TERM.

Calculus, 5. (Mathematics, IX.)
Physics, 5. (Physics, IV.)
Surveying, 4. (Civil Engineering, IX.)
Chemistry, 5. (Chemistry, VI.)
Drawing, 1. (Civil Engineering, VII.)
Composition, 1. (English, VI.)
Military Drill, 2. (Military, IV.)
***Summer Surveying, 2 1-2 weeks.
(Civil Engineering, XXI.)

JUNIOR YEAR.

FIRST TERM.

Analytical Mechanics, 4. (Mechanical Engineering, I.)
Electricity and Magnetism, 3. (Physics, VI.)

Political Economy, 5. (Economic Science, I.)
Railway Engineering, 5. (Civil Engineering, X.)
Physical Laboratory, 2. (Physics, XIV.)
Seminar, 1. (Civil Engineering, XXVII.)
****Debating, 1. (English, VII.)

SECOND TERM.

Analytical Mechanics, 4. (Mechanical Engineering, I.)
Materials of Construction, 3. (Mechanical Engineering, III.)
Roads and Pavements, 2. (Civil Engineering, XII.)
Railway Engineering, 5. (Civil Engineering, XI.)
Spherical Trigonometry, 2. (Mathematics, XII.)
Structural Designing, 2. (Civil Engineering, XIII.)
Engineering Laboratory, 2. (Civil Engineering, XIV.)
Seminar, 1. (Civil Engineering, XXVII.)
***Summer Surveying, 2 1-2 weeks. (Civil Engineering, XXXIII.)

In place of the two and a half weeks summer surveying for any year there may be substituted not less than three weeks actual engineering work done for some competent engineer, a reputable firm, or department engaged in engineering work.

****Debating, 1.

SENIOR YEAR.

FIRST TERM.

Framed Structures, 5. (Civil Engineering, XVII.)
Hydraulics, 4. (Mechanical Engineering, VI.)
Geology, General, 8 weeks, 5 / Economic, 8 weeks, 3 } 4. (Geology, III.)
Or Psychology, 5. (Psychology, I.)
Stereotomy, 2. (Civil Engineering, XX.)

***All students in Civil Engineering go into camp two and one-half weeks each summer vacation and conduct an organized topographical survey.

****Elective, subject to approval of Professor of Civil Engineering.

Sanitary Engineering, 3.	(Civil Engineering, XXI.)
Engineering Laboratory, 1.	(Civil Engineering, XV.)
Thesis, 1.	(Civil Engineering, XXV.)
Seminar, 1.	(Civil Engineering, XXIX.)

SECOND TERM.

Framed Structures, 2.	(Civil Engineering, XVIII.)
Designing, 4.	(Civil Engineering, XIX.)
Masonry Structures and Foundations, 4.	(Civil Engineering, XXIII.)
Spherical Astronomy, 3.	(Physics, VIII.)
Hydraulic Engineering, 3.	(Civil Engineering, XXII.)
Engineering Laboratory, 1.	(Civil Engineering, XVI.)
Thesis, 3.	(Civil Engineering, XXVI.)
Seminar, 1.	(Civil Engineering, XXX.)

DEPARTMENT OF ELECTRICAL ENGINEERING.

LOUIS BEVIER SPINNEY, PROFESSOR.

B. S. LANPHEAR, ASSISTANT PROFESSOR.

This department aims to meet the needs of young men who have in mind the practice of electrical engineering in any of its various applications in the business world.

It has been outlined with a view to securing for the student a thorough drill in those sciences, the principles of which underlie all electrical engineering practice, to secure for him a training in the application of scientific principles to the solution of practical problems in engineering and to familiarize him with such methods of the laboratory and testing room as are available for practical and commercial determinations.

The sciences of Mathematics, Physics and Chemistry are emphasized, as it is believed they are of first importance in such a course. The attention of the student is directed to the value of these subjects and he is urged to give them his most careful consideration.

In recognition of the fact that a knowledge of Mechanical Engineering is essential to many electrical engineering

operations, a large part of the student's time is devoted to a training in this direction. The mechanical engineering work required of students in this course, includes mechanical drawing, shop-work, kinematics, machine design, analytical mechanics, hydraulics, materials of construction, engineering laboratory and the study of the steam engine.

Mechanical Drawing is taken up in the first term of the Freshman year and extends through the Sophomore year.

Shop-Work extends to the end of the Junior Year and includes work in the carpenter shop, in the forge shop and foundry and in the machine shop.

In the course in engineering laboratory the work consists in tests of the strength of materials, viscosity of oils, efficiency of belt transmission, measurement of power, etc.

The study of the steam engine is made as practical as possible by the taking and studying indicator cards, the setting of valves, the measurement of clearance, etc.

These several topics are fully discussed elsewhere under the head of Mechanical Engineering.

Physics is the basis of the study of electricity and magnetism, the phenomena of which underlie electrical engineering theory and design, and is manifestly of sufficient importance to demand considerable time and attention in the training of the electrical engineer. In addition to the work in physics prescribed for all engineering students, the electrical engineering student spends six to twelve hours per week in the Junior and Senior years in the physical laboratory and class room.

Specialization begins in the Junior year with the advanced course in Electricity and Magnetism.

Laboratory work begins in the first term of the Junior year with a two hour (i. e. two afternoons per week) course in general physics. Laboratory work in electricity and magnetism, including work in the dynamo room and testing laboratory extends throughout the last two years of the course.

The first work in the physical laboratory embodies the accurate measurements of lengths, mass and time, the adjustment and use of physical instruments and the determinations of physical constants. In the laboratory course in electricity and magnetism the student makes a study of primary and secondary batteries and the electrical instruments of the laboratory, the determination of the constants of measuring instruments and the methods of measuring the several electrical quantities.

The laboratory work in Light and Sound consists largely in photometric measurements of various forms of commercial lamps.

In the laboratory work of the Senior year the more practical applications of the principles of electro-magnetism are studied, together with the principles of the magnetic circuit, of current flow, etc.

The topics of electric wiring, power transmission, electro-chemistry, telegraphy, telephony and electric signalling receive attention in the latter part of the course. The laboratory work in these various topics is made to conform to the text-book and lecture work.

The study of alternating currents and alternating current machinery is taken up in the Senior year. In the class-room work much stress is placed upon the theory of alternating currents and in the laboratory the student is afforded opportunity to study and familiarize himself with the phenomena peculiar to such currents.

The department possesses sixteen experimental dynamos, including two arc machines, one 250 light Diamond Alterntor and one 10 light Pony alternator; one ten horse-power motor-generator giving one- two and three phase currents on the A. C. side; also one 25-horse-power M. P. Ahlms-Edwards, direct-current motor and other series and shunt wound continuous-current machines. There are also transformers of various types and a secondary battery of fifty cells.

In addition to this equipment the student has access, for experimental and test purposes, to the electric machin-

ery of the College power house and lighting plant. Among other machines in this plant are two 15 K. W. Edison dynamos, one four-pole 18 K. W. compound-wound generator by the American Engine Company, one 15 K. W. alternator, and one 30 K. W. alternator. There is also a series of motors for driving the machinery of the Mechanical Engineering Department which range in size from five to twelve horse-power, which are available for test purposes.

An extended system of wiring connects all rooms of the department with the switchboards of the dynamo laboratory and the apparatus room. At these switchboards are the terminals of a line connecting with a 110 volt, 150 ampere, direct-current machine, which is available as a current source during the day. During the evening hours there are available 110 volt direct or alternating current circuits.

The courses offered by the Department of Electrical Engineering are outlined specifically below. The course numbers are those given in the discussion of courses offered by the Department of Physics.

COURSE III.—*Mechanics and heat*, first term.

COURSE IV.—*Light and Sound, Electricity and Magnetism*, second term. Two lectures and three recitations per week. Mathematics IV, V and VI required. Course III is a prerequisite of Course IV.

In this course stress is placed upon the fundamental principles of the subject and a very thorough study is made of vector quantities and their graphical treatment in problem work.

The various subjects are discussed from a mathematical standpoint, and the student is urged to familiarize himself with the theoretical side of the work, as it is believed such a foundation is very helpful, if not absolutely essential to the work which follows. Text-book, Hastings and Beach, "General Physics." Professor Spinney.

COURSE VI.—*Electricity and Magnetism.*—Three hours per week, first term. Physics III and IV and Mathematics VIII required.

Lectures, recitation and problem work. A course in the elementary theory of electricity and magnetism. Discussion of the principles of electro-magnetic action and their application in various forms of measuring instruments and the development of laboratory methods of measuring the several electrical quantities.

Text-book, Nichols and Franklin's "Elements of Physics," Vol. II. Professor Lanphear.

COURSE X.—*Dynamo Electric Machinery.*—Lectures and recitations, four hours per week, second term. Physics VI is a prerequisite of this course.

General theory of the direct-current dynamo, the establishment of electro-motive forces by induction, the magnetic circuit, armature winding, etc. A study of "characteristic curves" and the adaptation of the different types of direct-current machinery to various commercial purposes is included.

As a text and reference book S. P. Thompson's "Dynamo Electric Machinery" is used. Professor Lanphear.

COURSE XI.—*Alternating Currents.*—Lectures and recitations, four hours per week, first term. Physics X required.

Discussion of the theory of alternating currents, study of the circuit containing self-induction and capacity, methods of measuring current, electro-motive force and power in alternating current circuits.

Text-book, Jackson's "Alternating Currents and Alternating Current Machinery." Professor Spinney.

COURSE XII.—*Applied Electricity.*—Lectures and Problems, four hours per week, second term. Physics XI required.

Continuation of Course XI. Study of alternating current machinery—dynamos, transformers, etc., including a discussion of the synchronous motor, the induction motor, the rotary transformer and polyphase current machinery.

Discussion of high-potential transmission lines and electrical machinery adapted to transmission purposes.

Text-books and references, Jackson's "Alternating Currents and Alternating Current Machinery," Franklin and Williamson's "Alternating Currents," Thompson's "Polyphase Electric Currents," Bedell and Crehore's "Alternate Currents," etc. Professor Spinney.

COURSE XIII.—*Telephony.*—Lectures and Recitations, one hour per week, second term. A general study of the principles of telephony, the telephone, telephone lines, cables and commercial apparatus. Open to seniors in Electrical Engineering as an elective. Professor Lanphear.

COURSE XIV.—*General Physical Laboratory.*—One or two afternoons per week, first term, or,

COURSE XV.—One or two afternoons per week, second term. Measurement of length, mass and time. Determination of physical constants, use of the barometer, thermometry, calorimetry, etc. Professor Spinney and Mr. Tuttle.

COURSE XVI.—*Physical Laboratory, Elementary Electrical Measurements.*—Two afternoons per week, first term, or,

COURSE XVII.—Two afternoons per week, second term. The measurement of the electro-motive force and internal resistance of primary and secondary batteries, the use of Wheatstone's bridge, measurement of current, determination of galvanometer constants, high resistance measurements, insulation tests, etc. Professor Spinney and Mr. Tuttle.

COURSE XVIII.—*Physical Laboratory, Electrical Testing.*—Two afternoons per week, first term, or,

COURSE XIX.—Two afternoons per week, second term. Calibration of instruments, absolute measurements, etc. Professor Spinney and Mr. Tuttle.

COURSE XX.—*Physical Laboratory, Dynamo, Motor and Commercial Plant Testing.*—Three afternoons per week, first term.

The efficiencies of dynamos and motors, experimental determination of characteristic curves, magnetic leakage, etc.

Critical study of commercial plants, determination of efficiencies, etc. Professor Lanphear.

COURSE XXI.—*Physical Laboratory.*—Study of alternating currents. Two afternoons per week, second term, Senior year.

Measurements of current, electro-motive force and power in alternating current circuits, experimental determination of mutual and self-inductances, capacities, etc.

The study of alternating current dynamos and motors and commercial transformers is included. Professor Lanphear.

COURSE XXII.—*Electric Circuits.*—Two hours per week, first term. Physics VI required.

Determination of size of leads, allowable cross-section of conductors from the standpoint of economy, taking into consideration, current prices of copper, etc., the rates of interest and the cost of electric energy. Professor Lanphear.

COURSE XXIII.—*Electrical Designing.*—The design of batteries, commercial ammeters, voltmeters, wattmeters, etc. One afternoon per week, second term, Junior Year. Professor Lanphear.

COURSE XXIV.—*Electrical Designing.*—One afternoon per week, first term, Senior year. The design of dynamos, motors, transformers, etc. Professor Lanphear.

COURSE XXV.—*Electrical Designing.*—Continuation of Course XXIV.

Three afternoons per week, second term, Senior year. Professor Lanphear.

COURSE XXVI.—*Thesis* begun, and

COURSE XXVII.—*Thesis* finished. Total equivalent of four hours per week for one term. Professor Spinney.

Each student in the course in Electrical Engineering is required to prepare a thesis in the Senior year representing, in the work done upon it, the equivalent of at least four hours per week for one term.

This thesis may be of the nature of the design and construction of some electrical machine or measuring in-

strument, the efficiency test and critical study of some dynamo-electric machine or power plant, or of electrical research work of special direction.

COURSE XXIX.—*Electrical Seminar.*—One hour per week first term and

COURSE XXX.—*Electrical Seminar.*—One hour per week, second term. A continuation of Course XXIX. Professor Spinney.

This course consists of the preparation, presentation and discussion of papers upon special assigned topics in electrical engineering.

It is required that the papers presented shall be carefully written out and submitted for critical reading to the professor in charge.

Journal reading is made a part of this course.

ELECTRICAL ENGINEERING.

ACADEMIC YEAR.

FIRST TERM.

Algebra, 5.	(Mathematics, I.)
English, 5.	(English, I.)
History, 5.	(History, I.)
Elocution, 2.	(Elocution, I.)
Drawing, 2.	(Mechanical Engineering, XIX.)

SECOND TERM.

Algebra, 5.	(Mathematics, II or III.)
Plane Geometry, 5.	(Mathematics, V.)
Elementary Rhetoric, 5.	(English, II.)
History, 3.	(History, III.)
Drawing, 2.	(Mechanical Engineering, XX.)

FRESHMAN YEAR.

FIRST TERM.

Advanced Algebra, 5.	(Mathematics, IV.)
French, 5, *or*	(Languages, I.)

German, 5. (Languages, V.)
Advanced Rhetoric, 5. (English, III.)
Shop-Work, 2. (Mechanical Engineering, XXIX.)
Mechanical Drawing, 2. (Mechanical Engineering, XXI.)
Military Drill, 2. (Military, I.)
Library Work, 4 hours. (Library, I.)

SECOND TERM.

Solid Geometry and Plane Trigonometry, 5. (Mathematics, VI.)
French, 5, *or* (Languages, II.)
German, 5. (Languages, VI.)
Composition, 1. (English, IV.)
Descriptive Geometry, 5. (Civil Engineering, IV.)
Shop-work, 2. (Mechanical Engineering, XXX.)
Military Drill, 2. (Military, II.)
Library Work, 4 hours. (Library, II.)

SOPHOMORE YEAR.

FIRST TERM.

Analytical Geometry, 5. (Mathematics, VIII.)
Physics, 5. (Physics, III.)
Chemistry, 5. (Chemistry, III.)
Shop-Work, 2. (Mechanical Engineering, XXXI.)
Mechanical Drawing, 2. (Mechanical Engineering, XXII.)
Composition, 1. (English, V.)
Military Drill, 2. (Military, III.)

SECOND TERM.

Calculus, 5. (Mathematics, IX.)
Physics, 5. (Physics, IV.)
Chemistry, 5. (Chemistry, VI.)
Shop-Work, 2. (Mechanical Engineering, XXXIII.)
Mechanical Drawing, 2. (Mechanical Engineering, XXII.)
Composition, 1. (English, VI.)
Military Drill, 2. (Military, IV.)

JUNIOR YEAR.

FIRST TERM.

Differential Equations, 3. (Mathematics, X.)
Analytical Mechanics, 4. (Mechanical Engineering, I.)
Electricity and Magnetism, 3. (Physics, VI.)
Political Economy, 5. (Economic Science, I.)
Engineering Laboratory, 1. (Mechanical Engineering, XII.)
Shop-Work, 2. (Mechanical Engineering, XXXIII.)
*Debating, 1. (English, VII.)
Physical Laboratory, 2. (Physics, XIV.)

SECOND TERM.

Analytical Mechanics, 4. (Mechanical Engineering, II.)
Dynamo-Electric Machinery, 4. (Physics, X.)
Steam Engine, 3. (Mechanical Engineering, IV.)
Materials of Construction, 3. (Mechanical Engineering, III.)
Electrical Design, 1. (Physics, XXIII.)
Engineering Laboratory, 1. (Mechanical Engineering, XIII.)
Physical Laboratory, 2. (Physics, XVII.)
Shop-Work, 2. (Mechanical Engineering, XXXIV.)
*Debating, 1. (English, VIII.)

SENIOR YEAR.

FIRST TERM.

Alternating Currents, 4. (Physics, XI.)
Hydraulics, 4. (Mechanical Engineering, VI.)
Steam Engine Design, 3. (Mechanical Engineering, VII.)
Physical Laboratory, 3. (Physics, XX.)
Electrical Design, 1. (Electrical Engineering, XXIV.)
Electric Circuits, 2. (Electrical Engineering, XXII.)
Seminar, 1. (Electrical Engineering, XXIX.)
Thesis, 1. (Electrical Engineering, XXVI.)

*Elective, subject to the approval of the Professor of Electrical Engineering.

SECOND TERM.

Constructive Engineering, 3.	(Mechanical Engineering, IX.)
Physical Laboratory, 2.	(Physics, XXI.)
Electrical Design, 3.	(Electrical Engineering, XXV.)
Applied Electricity, 4.	(Physics, XII.)
**Telephony, 1.	(Electrical Engineering, XIII.)
Seminar, 1.	(Electrical Engineering, XXX.)
Thesis, 3.	(Electrical Engineering, XXVII.)

DEPARTMENT OF MINING ENGINEERING.

SAMUEL WALKER BEYER, PROFESSOR.
MR. WILLIAMS AND MR. YOUNG, ASSISTANTS.

The courses in Mining Engineering are planned to give the student a ready familiarity with the branches which form the ground-work of the sciences of Mining and Metallurgy. The department of Mining Engineering aims to give him such a thorough training in the fundamentals as will enable him after graduation to acquire in a comparatively short time the practical experience absolutely necessary before he is fitted to assume positions of great responsibility in the mining industries. The department offers three courses: A four years; a two years; and a one term course. The first is intended for those students who desire a "thorough course in Theoretical and Practical Mining," and underlying sciences, and lead to the degree of Bachelor of Science in Mining Engineering. The requirements for admission are the same as those for admission to other Engineering courses. Students who pursue this course to completion are expected to be able to undertake the "full management of mining in its various branches," at least as practiced in Iowa and to become familiar with the principles involved and the methods employed in good mining engineering practice in general.

The second course is designed for young men who have had some practical experience in mines, and wish to

**Elective.

study mine surveying, drafting, the problems of ventilation, drainage, haulage, mine operating, etc., and also to learn something of the sciences which bear upon their work but have neither the time nor the preparation for a full college course. Elementary mathematics, drawing and shop work receive considerable attention during the first year, while the professional studies are reserved for the second year. Candidates who are twenty-one years of age or over are admitted without examination. All others must give evidence of a thorough grounding in the common branches.

The third is specially adapted to men actively employed in the mining industry, but who have neither time nor the opportunity to prepare themselves to meet the entrance requirements for the regular four years' course or to spare the time to complete the two years' course. It is intended more particularly for a review course for mine superintendents, mine foremen, and the more progressive miners. The course embraces a review of the principles of mine ventilation and drainage; mine operation and equipment; mine surveying and accounts; mechanical engineering applied to mining; the principles of prospecting, mode of occurrence and distribution.

EQUIPMENT.

The department of Mining Engineering is located in Morrill Hall*, dividing quarters with the department of Geology. The description of rooms, collections and apparatus which may be found under the latter department will apply almost equally well to mining engineering. In addition to the apparatus previously listed and described, the department is supplied with a Sullivan core drill with a complete set of tools and accessories for actual field operations; a "Queen" Light Mountain mining transit; a sensitive six-dial, anemometer reading to ten millions of

*Beginning with the Fall of 1902, the Departments of Mining and Geology will have quarters in the new Engineering Hall now being erected.

feet and adapted for the measurement of currents of air through mines and tunnels—an instrument absolutely necessary in order to deal intelligently with the problems of mine ventilation; a miner's level with rods and measuring tape; a plane table with accessories; a set of miner's tools; a barometer, clinometer, balances, a series of miner's lamps and various instruments used in ascertaining distances.

The proximity of Ames to the Iowa coal field affords easy access to the coal mines at Boone and Des Moines. The great centers of the clay industries, Des Moines, Boone and Fort Dodge are equally accessible, while the quarries of Marshall county are scarcely more than an hour's ride from the College. These and numerous allied industries are, after all, the most important and indispensible laboratories for the practical Mining Engineer. The department undertakes to present the accepted theories concerning mineral aggregation, origin and occurrence, but these theories can only be put to the test by an intelligent use of the drill, the level and the plane table. The accredited methods of winning the ores and minerals receive full discussion in the class room, but only render obvious the necessity of becoming familiar with the practical workings of the sluice box, the tipple and the stamp mill. The chemical and physical properties of a clay may be ascertained in the laboratory, but a complete knowledge of its properties and its proper mode of treatment can only be gained by following it from the pit to the street. In short, the department aims to give as complete an exposition of the theories and laws which underlie the Science of Mining as the time will permit, but the verification and application of these theories and laws must be made, in large measure in the field and in the industries.

COURSES IN MINING.

The work of the first two years in the four years course in Mining Engineering is exactly the same as that required in the course in Mechanical Engineering, with the excep-

tion that Surveying takes the place of Mechanical Drawing. The professional studies are given due prominence during the last two years of the course and the student is required to take continuous work in mining, chemistry and geology through the last three terms. He is expected to make one of these branches the subject of special investigation and to embody the results of such investigation in a thesis, which is required of every student who is a candidate for graduation.

It is generally recognized that there is of necessity a considerable gap between the work included in the college curriculum and that of the professional engineer; and that the student in engineering must gain the larger part of his professional training outside of college walls. The courses in summer field work are offered in the hope that his apprenticeship may be reduced to a minimum, and are required of all students in the four years' course in Mining Engineering.

COURSE I.—*The Principles of Mining.*—Second term, Junior Year and counts four hours per week. The first ten weeks of the term are devoted to a consideration of the methods employed in excavating, boring and shaft-sinking, and in mining and the support of mine excavations, while the remainder of the term is given up to a critical study of methods employed in exploration, development and mine working in general.

COURSE II.—*Continuation of Course I.*—Four hours per week and runs through the first term, Senior Year. The work embraces a thorough discussion of the principles involved in coal mining in general and is followed by a careful consideration of those principles which are applicable to the Iowa coal fields in particular. Mine ventilation, drainage and lighting receive due attention.

COURSE III.—*Mining Engineering.*—Second term, Senior Year, and counts four hours per week. Mine plant, administration and mine accounts receive especial attention. The term's work involves a critical study of mining ma-

chinery, with especial reference to the types best adapted to meet the requirements of the various conditions in actual practice. Also mine buildings and the general equipment and administration of a mine plant are considered. At the beginning of the term's work, a short period is given to a theoretical consideration of ore-dressing.

COURSE IV.—*Seminar.*—Required of all students in Mining Engineering and counts one hour during the Junior and Senior Years.

COURSE V.—*Thesis.*—Required of all candidates for graduation in the course of Mining Engineering and counts one hour during the first term, Senior Year, and three hours during the second term.

COURSE VI.—*Ventilation and Haulage.*—Five hours per week, first term of the two years course in Mining. The work of the term is devoted to a careful consideration of the problems effecting the distribution of air in mines and mine drainage. Some attention is given to the discussion of standard methods of hoisting and haulage in mines.

COURSE VII.—*Mine Exploration and Operation.*—Five hours per week during the last term in the two years course in Mining. Exploration, shafting, timbering, and methods of mine operation, especially as adapted to the Iowa coal fields are the principal topics treated. Mine accounts and administration receive such attention as their importance and the time will permit.

COURSE VIII.—*Mining Arithmetic.*—Five hours per week first term of first year in the two years course in Mining. The fundamental operations in arithmetic are reviewed rapidly during the first half of the term, while measurements, square and cube root and practical problems relating to mining are made duly prominent during the last half of the term.

COURSE VIII (a).—*Mining Arithmetic.*—Five hours per week in the review course in Mining Engineering. Includes the application of the fundamental operations in arithmetic to mining problems.

COURSE IX.—*One-Term Course in Mining.*—Five hours pc. week. The leading topics considered are the principles employed in exploring ,shafting, timbering, draining and ventilating coal mines. The use of explosives and coal cutting machinery also receives some attention.

COURSE X.—*Field Work in Mine Surveying.*—First term, first year in the two years' course in Mining Engineering. The first year men serve as apprentices in the work of mine surveying, acting in the capacity of rod-men and chain-men to the parties conducted by higher classmen.

COURSE XI.—*A Continuation of Course X.*—During the first half of the term on account of the usual inclemency of the weather, one half day per week is devoted to a study of mine plats and maps.

COURSE XII.—*Field Work in Mining.*—First term, second year, and required of students in the two years' course in Mining.

COURSE XIII.—*Continues the Work of Course XII.*—Special attention is directed to mine operation and equipment.

COURSE XIV.—*Ceramics.*—The work of the term is devoted to a consideration of the origin, composition, properties and distribution of the crude materials used in the clay and cement industries. The physical properties of clays are studied and mechanical analyses are made in the laboratory, parallelling the class-room work.

COURSE XV.—*Ceramics.*—The course includes a discussion of the principles involved in the manufacture of clay goods. Methods of selecting and winning of the raw materials, their preparation, standard processes of manufacture, burning and clay testing are treated as fully as the time will permit.

COURSE XVI.—*Summer Field Work in Mine Surveying.*—The work is carried on in one of the coal mining districts of the state and comprises the complete survey of a mine and a thorough examination of the equipment and mode of operation of a typical mine for the district, and leads in the first place to a mine map, and in the second to a care-

ful report on a mine property, accompanied by the necessary illustrations. The time required is two full weeks. Open to students who have completed the Sophomore or Junior years.

COURSE XVII.—*Summer Field Work in the Study of Mine Operation and Equipment, and of Concentrating Plants.*—This course necessitates a visit to one of the great metal producing centers. A careful study of mine properties is made, and a detailed report, properly illustrated by sketches and drawings, is required. A portion of the time is to be devoted to a study of ore dressing and concentrating plants. The time required is four weeks, and the course is open to students who have completed the Junior or Senior years. XVI and XVII are taken in alternate years; Course XVI beginning in 1901.

COURSES in Geology required of students in Four Year Course in Mining Engineering.

COURSE II.—*General Geology.*—Five hours per week first half of Junior Year. This course embraces a discussion of the principles which form the groundwork of the science. The first ten weeks are devoted to dynamic and structural geology and the last six weeks to stratigraphic and historical geology. The student is required to make several excursions to points of geological interest to verify the more salient facts discussed in the class-room. Prerequisites: Physics III and IV and Chemistry III and IV.

COURSE IV.—*Geology. Advanced.*—Five hours per week, second term of Senior Year. The nature, mode of occurence and origin of the minerals and rocks which constitute the earth's crust, are considered in some detail in the first half of the term, while rock alteration as involved in metamorphism and weathering receives special attention during the second half. Excursions are continued as in Course II, and students are encouraged to familiarize themselves with the Methods employed in doing research work and to make independent observations. Prerequisite: Geology II.

COURSE VI.—*Mineralogy.*—Three hours class-room and one hour laboratory per week, second half of Junior Year. This course is intended to give the student a clear idea of the morphological and physical properties of crystalline substances. Prerequisites: Physics III and IV, Chemistry III and IV and Mathematics VI.

COURSE VII.—*Mineralogy. Descriptive and Determinative.* —Three hours class-room work and one hour laboratory per week, first term of Senior Year. This work is devoted to the study of the more important mineral species, their properties, uses, distribution and methods of determination.

COURSE IX.—*The Geology of Coal.*—Five hours per week in the review course in mining. The processes of erosion, transportation and sedimentation are hastily reviewed and the origin, mode of accumulation and distribution of coal are treated in some detail. Rock structure, with especial reference to scientific prospecting and the economic mining of coal receives due attention.

MINING ENGINEERING.

ACADEMIC YEAR.

FIRST TERM.

Algebra, 5.	(Mathematics, I.)
English, 5.	(English, I.)
History, 5.	(History, I.)
Elocution, 2.	(Elocution, I.)
Drawing, 2.	(Mechanical Engineering, XIX.)

SECOND TERM.

Algebra, 5.	(Mathematics, II or III.)
Plane Geometry, 5.	(Mathematics, V.)
Elementary Rhetoric, 5.	(English, II.)
History, 3.	(History, II.)
Drawing, 2.	(Mechanical Engineering, XX.)

FRESHMAN YEAR.

FIRST TERM.

Advanced Algebra, 5.	(Mathematics, IV.)
French, 5, *or*	(Languages, I.)
German, 5.	(Languages, V.)
Advanced Rhetoric, 5.	(English, III.)
Shop-Work, 2.	(Mechanical Engineering, XXIX.)
Mechanical Drawing, 2.	(Mechanical Engineering, XXI.)
Military Drill, 2.	(Military, I.)

SECOND TERM.

Solid Geometry and Plane Trigonometry, 5.	(Mathematics, VI.)
French, 5, *or*	(Languages, II.)
German, 5.	(Languages, VI.)
Composition, 1.	(English, IV.)
Descriptive Geometry, 5.	(Civil Engineering, IV.)
Shop-Work, 2.	(Mechanical Engineering, XXX.)
Military Drill, 2.	(Military, II.)
Mechanical Drawing, 2.	(Mechanical Engineering, XXII.)

SOPHOMORE YEAR.

FIRST TERM.

Analytical Geometry, 5.	(Mathematics, VIII.)
Surveying, 4.	(Civil Engineering, VIII.)
Physics, 5.	(Physics, III.)
Chemistry, 5.	(Chemistry, III.)
Composition, 1.	(English, V.)
Military Drill, 2.	(Military, III.)

SECOND TERM.

Calculus, 5.	(Mathematics, IX.)
Surveying, 4.	(Civil Engineering, IX.)
Physics, 5.	(Physics, IV.)

Chemistry, 5.	(Chemistry, VI.)
Composition, 1.	(English, VI.)
Military Drill, 2.	(Military, IV.)

JUNIOR YEAR.

FIRST TERM.

Analytical Mechanics, 4.	(Mechanical Engineering, I.)
Electricity and Magnetism, 3.	(Physics, VI.)
Geology, 5.	(Geology, II.)
Political Economy, 5.	(Economic Science, I.)
Physical Laboratory, 2.	(Physics, XIV.)
Seminar.	(Mining Engineering, IV.)
*Debating, 1.	(English, VII.)

SECOND TERM.

Analytical Mechanics, 4.	(Mechanical Engineering, II.)
Steam Engine, 3.	(Mechanical Engineering, IV.)
Mineralogy, 4.	(Geology, VI.)
Mining, 4.	(Mining Engineering, I.)
Chemistry, 5.	(Chemistry, VII and VIII.)
Seminar, 1.	(Mining Engineering, IV.)
*Debating, 1.	(English, VIII.)

SENIOR YEAR.

FIRST TERM.

Hydraulics, 4.	(Mechanical Engineering, VI.)
Mineralogy, 4.	(Geology, VII.)
Chemistry, 5.	(Chemistry, XI.)
Mining, 4.	(Mining Engineering, II.)
Engineering Laboratory, 1.	(Mechanical Engineering, XII.)
Specifications and Contracts, 1.	(Mechanical Engineering, VIII.)

*Elective, subject to the approval of the Professor of Mining Engineering.

Seminar, 1. (Mining Engineering, IV.)
Thesis, 1. (Mining Engineering, V.)

SECOND TERM.

Materials of Construction, 3. (Mechanical Engineering, III.)
Geology, 5. (Geology, IV.)
Metallurgy, 3. (Chemistry, XII.)
Mining, 4. (Mining Engineering, III.)
Engineering Laboratory, 1. (Mechanical Engineering, XIII.)
Seminar, 1. (Mining Engineering, IV.)
Thesis, 3. (Mining Engineering, V.)

TWO YEARS COURSE IN MINING ENGINEERING.

FIRST YEAR.

FIRST TERM.

Mining Arithmetic, 5. (Mining Engineering, VIII.)
Elementary Algebra, 5. (Mathematics, I.)
Elementary Physics, (Physics, V.)
Drawing, 2. (Mechanical Engineering, XX.)
Shop-Work, 2. (Mechanical Engineering, XXIX.)
Field Work in Mine Surveying, One-half Day Per Week. (Mining Engineering, X.)

SECOND TERM.

Geometry, 5. (Mathematics, V.)
Advanced Algebra, 5. (Mathematics, II.)
Plane Trigonometry, 5. (Mathematics, VI.b)
Physical Geography, 3. (Geology, I.)
Drawing, 2. (Mechanical Engineering, XXI.)
Shop-Work, 2. (Mechanical Engineering, XXX.)
Field Work in Mining One-half Day Per Week. (Mining Engineering, XII.)

SECOND YEAR.

FIRST TERM.

Mining, 5. (Mining Engineering, V.)
Mine Surveying, 3. (Civil Engineering, XXXIV.)

Engineering Geology, 4. (Geology, III.)
Chemistry, 5. (Chemistry, III.)
Mechanical Drawing, 2. (Mechanical Engineering, XXII.)
Field Work in Mining Engineering, 1.
(Mining Engineering, XII.)
Engineering Laboratory, 1. (Mechanical Engineering, XII.)

SECOND TERM.

Mining, 5. (Mining Engineering, VII.)
Mechanical Engineering, 2.
(Mechanical Engineering, XXVIII.)
Economic Geology, 5. (Geology, IV.)
Chemistry, 5. (Chemistry, VI.)
Engineering Laboratory, 2. (Mechanical Engineering, XIII.)
Field Work in Mining Engineering, 1.
(Mining Engineering, XIII.)

REVIEW COURSE IN MINING ENGINEERING.

The course begins August 28th, 1900, and February 13th, 1901, and continues sixteen full weeks. It is especially designed to assist young men to meet the requirements of the law passed by the Legislature of 1899, requiring examinations of mine foremen, pit bosses and hoisting engineers. No entrance examination is required.

Economic Coal Mining, 5. (Mining Engineering, IX.)
Mine Surveying, 3. (Civil Engineering, XXXIII.)
Mining Arithmetic, 5. (Mining Engineering, VIII a.)
Geology of Coal, including Prospecting, 5. (Geology, X.)
Mechanical Engineering, 2.
(Mechanical Engineering, XXVIII.)

COURSE IN CLAY-WORKING AND CERAMICS.

The short course in clay-working is designed to assist young men to a knowledge of the fundamental principles which underlie the science of Ceramics. The course is

offered with the view of extending the same sort of service to the Ceramic industries as the course in Agriculture renders to the Agricultural industries, or the course in Mechanical Engineering renders to the Mechanical industries.

TWO YEARS COURSE IN CERAMICS.

FIRST YEAR.

FIRST TERM.

Elementary Mineral Chemistry, 5. (Agricultural Chemistry, XIII.)
Elementary Algebra, 5. (Mathematics, I.)
Elementary Physics, 3. (Physics, V.)
Drawing, 2. (Mechanical Engineering, XX.)
Shop-Work, 2. (Mechanical Engineering, XXIX.)

SECOND TERM.

Mineral and Geological Chemistry, 5. (Agricultural Chemistry, XIV.)
Plane and Solid Geometry, 5. (Mathematics, V.)
Physical Geography, 3. (Geology, I.)
Drawing, 2. (Mechanical Engineering, XXI.)
Shop-Work, 2. (Mechanical Engineering, XXX.)

SECOND YEAR.

FIRST TERM.

Chemistry of Clays, 5. (Agricultural Chemistry, XV.)
Ceramics, 5. (Mining Engineering, XIV.)
Engineering Geology, 4. (Geology, III.)
Mechanical Drawing, 2. (Mechanical Engineering, XXII.)

SECOND TERM.

Chemistry of Clays and Glazes, 5. (Agricultural Chemistry, XVI.)
Ceramics, 5. (Mining Engineering, XV.)

Mechanical Engineering, 2.
(Mechanical Engineering, XXVIII.)
Economic Geology, 5. (Geology, IV.)
Testing Clay Products, 3. (Civil Engineering,)

TECHNOLOGY.

The course of instruction in Technology is intended for those who may desire to equip themselves for a career in an industrial field and to which the sciences of chemistry and engineering are closely related. In the manufacturing industries the chemist is becoming more and more an important factor, and the improved manufacturing processes are largely the results of his investigations.

The most important manufacturing processes must be constantly under the control of one familiar with every detail, and not only is this knowledge required but it may be said that one should be also an expert in obtaining from any process the maximum quantity of a desired product and a minimum quantity of materials which may be called by-products.

It would naturally appear, therefore, that one who desires to enter an industrial field should have a thorough foundation in chemistry as it is related to the technical industries and in the engineering sciences. The important work of the chemist as an aid to developing the industries of the world has been recognized for many years in the older countries and the successful manufacturers are those who apply the sciences to the greatest extent to the processes which are carried on in their factories.

With the organization of the manufacturing industries of the west there will be a tendency for these organizations to follow in the steps of those which have been successful in the old countries and as a result there will be a desire for well equipped, scientifically trained men for managers and superintendents. With the short time which the young man has at his disposal for his training, it will be readily

seen that his training should have for its object the special attention to the application of those sciences connected with the industrial processes and endeavor to equip him to such an extent that he can readily specialize in any desired industry.

With this idea in view the course of study has been arranged to present to the student the most important studies in Agricultural, Geological, Analytical, Technical Chemistry and Civil, Mechanical and Electrical Engineering in their relations to his future field of work.

TECHNOLOGY.

The Freshman and Sophomore work to consist of the first two years in Mechanical Engineering, Civil Engineering or Electrical Engineering.

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Technical Chemistry	5	Technical Chemistry	5
Language	5	Language	5
Engineering Geology	4	Economic Geology	5
Electricity and Magnetism and Physical Laboratory	5	Botanical Microscopical Chemistry	5

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Technical Chemistry	7	Technical Chemistry	7
Sanitary Engineering	2	Steam Engine	3
Ceramics	5	Materials of Construction	3
Engineering Laboratory	2	Engineering Laboratory	2
Bacteriology	2	Water Works Engineering	2
Specifications and Contracts	1	Thesis	3
Thesis	1		

DIVISION OF SCIENCE AS RELATED TO INDUSTRIES

MATHEMATICS.
PHYSICS,
CHEMISTRY,
BOTANY,
ZOOLOGY,
GEOLOGY,
ECONOMIC SCIENCE,
DOMESTIC ECONOMY,
PSYCHOLOGY AND ETHICS,
LITERATURE AND RHETORIC,
ELOCUTION,
LATIN,
MODERN LANGUAGES,
HISTORY,
MILITARY SCIENCE.
LIBRARY.
MUSIC,

FACULTY.

W. M. BEARDSHEAR, A. M., LL. D.,
President, and Professor of Psychology and Ethics.

M. STALKER, M. Sc., V. S.,
Professor of Veterinary Science.

EDGAR WILLIAM STANTON, M. Sc.,
Professor of Mathematics and Economic Science.

GEN. JAMES RUSH LINCOLN,
Professor of Military Science.

ALFRED ALLEN BENNETT, M. Sc.,
Profesor of Chemistry.

LOUIS H. PAMMEL, B. Ag., M. Sc., Ph. D.,
Professor of Botany.

GEORGE WELTON BISSELL, M. E.,
Professor of Mechanical Engineering.

ANSON MARSTON, C. E.,
Professor of Civil Engineering.

MISS LIZZIE MAY ALLIS, B. A., M. A.,
Professor of French and German.

LOUIS BEVIER SPINNEY, B. M. E., M. Sc.,
Professor of Physics and Electrical Engineering.

SAMUEL WALKER BEYER, B. Sc., Ph. D.,
Professor of Geology.

ALVIN B. NOBLE, B. Ph.,
Professor of Rhetoric and English Literature.

HENRY E. SUMMERS, B. Sc.,
Professor of Zoology.

ADRIAN M. NEWENS, B. O.,
Professor of Elocution and Oratory and Associate in English.

ORANGE HARRY CESSNA, B. Sc., D. D.,
Professor of History, Psychology and Ethics.

LOUIS A. KLEIN, V. M. D.,
Professor of Veterinary Medicine.

JOHN H. McNEALL, V. M. D.,
Professor of Anatomy.

MISS MARY A. SABIN, B. A.,
Professor of Domestic Economy.

HOMER C. PRICE, M. S.,
Professor of Horticulture.

FRANK J. RESLER, B. PH.,
Director of Music, Vocalist.

MISS MARIA M. ROBERTS, P. L.,
Instructor in Mathematics.

MISS ELMINA T. WILSON, C. E.,
Instructor in Civil Engineering.

MRS. ELIZABETH RESLER, B. PH.,
Instructor in Instrumental Music.

MISS LOLA A. PLACEWAY, B. SC.,
Instructor in Chemistry.

MISS BESSIE B. LARRABEE, A. B.,
Instructor in English.

MISS HAZEL LEONI BEARDSHEAR, B. L.,
Instructor in Chemistry.

GORDON F. DODGE, B. M. E.,
Instructor in Free-Hand Drawing.

MISS IDA S. SIMONSON, B. L.,
Instructor in English.

MISS ELIZABETH MACLEAN, M. DI.,
Instructor in English.

IRA A. WILLIAMS, B. SC.,
Assistant in Geology.

E. B. TUTTLE, B. SC.,
Instructor in Physics.

ARTHUR T. ERWIN,
Instructor in Horticulture.

C. E. WOODRUFF, A. B.,
Director of Physical Culture and Instructor in Latin.

MISS A. ESTELLA PADDOCK, B. Sc.,
Instructor in Botany.

F. W. FAUROT, B. Sc.,
Instructor in Botany.

MISS SARAH ELLIS, B. L.,
Instructor in Domestic Economy.

MISS ALICE WARD HESS, B. Sc.,
Instructor in Domestic Economy.

MISS HELEN G. READ,
Instructor in English.

E. E. LITTLE, B. S. A.,
Assistant in Horticulture.

MISS VINA ELETHE CLARK,
Librarian.

MISS HELEN LOUISE KNAPP, B. L.,
Assistant Librarian.

DIVISION OF SCIENCE AS RELATED TO THE INDUSTRIES.

The courses of study in the Division of Science lead to the degree of Bachelor of Science.

Many of the courses of study taught in this Division form a very essential part of those belonging to the other Divisions, so that the work required for the various degrees conferred by the College authorities is very thoroughly interwoven.

The object of the work in this Division is very comprehensively expressed in the act of Congress establishing this and similar colleges. The founding of these colleges on a basis of scientific learning has proved to be the beginning of an important epoch in educational history. The courses of study in this Division are less technical than are many of those of the other Divisions. The real advances in modern civilization have been along the lines of

science study and investigation. It is the intent therefore to lay a broad foundation in scientific facts and principles in order to fit the graduate to fill his place in the affairs of the world. There can be no better preparation for the duties of life and for citizenship than the knowledge and mental training given by a genuine study of the sciences.

During the first two years the lines of study are well marked out and but little choice of subjects is given. The required mathematics end with the Freshman year. The subject may be pursued, however, for three terms longer, provided the student desires and is qualified to do so.

The various branches of the study of the English language extending throughout the Freshman and Sophomore years are sufficient in scope and purpose to give the needed training in the use of English. The modern languages, namely, French and German, are great storehouses of the sciences, and consequently courses of study in these languages are offered to the student in the earlier years of his work to enable him to use these languages in the last two years of his study.

The four lines of science study, namely, Physics, Botany, Zoology and Chemistry, which have been begun during the first two years, may be carried through the Junior and Senior years, thus enabling the student to gain considerable facility in any selected science. The work of these two years is quite broadly elective, the only restriction within the limits of the courses offered being that a minimum of ten hours per week shall be selected from the sciences, including, in addition to those just enumerated Geology, Mathematics and Economic Science. The study of the sciences is strongly supported by work in literary, historical and psychological lines.

The course of study for young women leading to the degree of bachelor of science permits a more extended study of the languages, and especially of French and German. A characteristic feature of the work for young women is the study of Domestic Economy. This subject is studied throughout the four years. The equipment and character of the work done in this direction are carefully

described under the topic, "Department of Domestic Economy." These courses of study in Domestic Economy are open also to young women who may be candidates for the degree of bachelor of science.

More detailed statements of the purpose and character of the courses of study pursued for the two degrees belonging to this Division are given under the statements for each department.

SCIENCE.

ACADEMIC YEAR.

FIRST TERM.

Algebra, 5.	(Mathematics, I.)
English, 5, *or*	(English, I.)
*Latin, 5, *or*	(Latin, I.)
German, 5.	(Languages, V.)
History, 5.	(History, I.)
Elocution, 2.	(Elocution, I.)
Drawing, 2.	(Mechanical Engineering, XIX.)

SECOND TERM.

Algebra, 5.	(Mathematics, II or III.)
Plane Geometry, 5.	(Mathematics, V.)
Elementary Botany, 2.	(Botany, I.)
Elementary Rhetoric, 5, *or*	(English, II.)
*Latin, 5, *or*	(Latin, II.)
German, 5.	(Languages, VI.)
History, 3.	(History, II.)

FRESHMAN YEAR.

FIRST TERM.

Advanced Algebra, 5.	(Mathematics, IV.)
Botany, Ecology, 2.	(Botany, II.)

*Latin or German may be taken only by those students who can show to the Professor of Rhetoric satisfactory evidence of Proficiency in the English of the Academic Year.

**Latin, 5 *or*	(Latin, I or III.)
**German, 5, *or*	(Languages, V or VII.)
French, 5.	(Languages, I.)
Physiography, 3.	(Geology, I.)
Advanced Rhetoric, 5.	(English, III.)
Sewing, 1 (for women).	(Domestic Economy, I.)
Military Drill, 2 (for men).	(Military, I.)
Library Work, 4 hours.	(Library I.)

SECOND TERM.

Solid Geometry and Plane Trigonometry, 5.	(Mathematics, VI.)
**Latin, 5, *or*	(Latin, II or IV.)
**German, 5, *or*	(Languages, VI or VIII.)
French, 5.	(Languages, II.)
Histology, 4.	(Botany, III.)
Entomology, 2.	(Zoology, I.)
Elocution, 1.	(Elocution, II.)
Composition, 1.	(English, IV.)
Hygiene and Cooking, 2 (for women).	(Domestic Economy, II.)
Military Drill, 2 (for men).	(Military, II.)
Library Work, 4 hours.	(Library II.)

SOPHOMORE YEAR.

FIRST TERM.

*Analytical Geometry, 5.	(Mathematics, VIII.)
*Cryptogamic Botany, 4.	(Botany, IV.)
*Vertebrate Zoology, 4.	(Zoology, II.)
Latin, 4, *or*	(Latin, V.)
German, 4. *or*	(Languages, III.)
French, 4.	(Languages, III.)
Physics, 5.	(Physics, I.)
Composition, 1.	(English, V.)

**Beginning or Advanced Latin or German according to the preparation of the student.

*The student shall elect two of these studies. The study omitted may be elected in the Junior or Senior year and counted in those years.

Hygiene and Cooking, 2 (for women). (Domestic Economy, III.)
Military Science, 2 (for men). (Military, III.)

SECOND TERM.

**Calculus, 5, *or* (Mathematics, IX.)
**Invertebrate Zoology, 4. (Zoology III.)
Chemistry, 8. (Chemistry, II.)
Physics, 5. (Physics, II.)
Composition, 1. (English, VI.)
Sewing, 1 (for women). (Domestic Economy, IV.)
Military Drill, 2 (for men). (Military, IV.)

*JUNIOR YEAR.

FIRST TERM.

Differential Equations, 3. (Mathematics, X.)
Advanced Crypotogamic Botany, 2. (Botany, VI.)
Economic Botany, 2. (Botany, X.)
Vegetable Cytology, 3. (Botany, XII.)
Chemistry, 5. (Chemistry, V.)
Political Economy, 5. (Economic Science, I.)
Elocution, 2. (Elocution, III.)
Debating, 1. (English, VII.)
Histology, 4. (Veterinary Science, XVI.)
English Literature, 3. (Literature, I.)
Entomology, 5. (Zoology, IV.)
**Photography, 2. (Physics, IX.)
Comparative Anatomy, 5. (Zoology, VII.)
Surveying, 4. (Civil Engineering, VIII.)
Physiology, 4. (Veterinary Science, XVII.)

**Choice between Calculus and Invertebrate Zoology. The study omitted may be taken in the Junior or Senior year and counted in those years.

*In the Junior and Senior years the student is permitted to elect from the list of subjects for each term the equivalent of not less than sixteen nor more than twenty hours per week. Of these at least ten hours per week in each term must be chosen from the mathematical, physical, natural, economic or domestic sciences.

**This subject may be taken only on the recommendation of the Professor in which the student takes the major part of his work.

Geology, 5. (Geology, II.)
Physical Laboratory, 1 or 2. (Physics, XIV.)
Military Science, 1. (Military, V.)

SECOND TERM.

Advanced Mathematics, 3. (Mathematics, XI.)
Animal Parasites, 2. (Zoology, VIII.)
Bacteriology, 2. (Botany, VII.)
Systematic Botany, 3. (Botany, XV.)
Organic Chemistry, 5, *or* (Chemistry, IX.)
Blow-pipe Analysis and Assaying, 5.
(Chemistry, VII and VIII.)
Political Economy, 5. (Economic Science, II.)
Elocution, 2. (Elocution, IV.)
Embryology, 3 to 5. (Zoology, V.)
Advanced Entomology, 3 to 5. (Zoology, IX.)
Debating, 1. (English, VIII.)
English Literature, 5. (Literature, II.)
Mineralogy, 4. (Geology, VI.)
Physical Laboratory, 1 *or* 2. (Physics, XV.)
Military Science, 1. (Military, VI.)
Public Speaking, 1, required (Elocution, VIII.)

SENIOR YEAR.

FIRST TERM.

Anatomy of Domestic Animals, 5. (Veterinary Science, I.)
Political Economy, 3. (Economic Science, III.)
Mineralogy, 4. (Geology, VI.)
History, Development of the United States, 3. (History, III.)
Fiction, 3. (Literature, III.)
Psychology, 5. (Psychology, I.)
Agrostology, 2. (Botany, XIII.)
Vegetable Pathology, 2. (Botany, V.)
Advanced Cryptogamic Botany, 3. (Botany, VI.)
Chemistry, 5. (Chemistry, XI or XIII.)
Elocution, 2. (Elocution, V.)
Physical Laboratory, 1 *or* 2. (Physics, XIV.)
Morphology, 3 *to* 5. (Zoology, X.)
Neurology, 3 *to* 5. (Zoology, XI.)

Advanced Entomology, 3 *to* 5.	(Zoology, IX.)
Military Science, 1.	(Military, VII.)
One oration, required.	(Elocution, IX.)
Botanical Seminar, 1.	(Botany, XVIII.)

SECOND TERM.

Astronomy, 5.	(Physics, VII.)
Geology, 5.	(Geology, IV.)
History of Civilization, 5.	(History, IV.)
American Literature, 3.	(Literature, V.)
Vegetable Physiology, 2.	(Botany, XI.)
Advanced Bacteriology, 3.	(Botany, VIII.)
Ethics, 3.	(Psychology, II.)
Elocution, 1.	(Elocution, VI.)
Chemistry, 5, *or*	(Chemistry, XIV.)
Chemistry, 3 *or* 5.	(Chemistry, XV.)
Evolution of Plants, 1.	(Botany, XIX.)
Advanced Entomology, 3 *to* 5.	(Zoology, IX.)
Physical Laboratory, 1 *or* 2.	(Physics, XV.)
Evolution of Cultivated Plants, 1.	(Horticulture, VI.)
Morphology, 3 *to* 5.	(Zoology, X.)
Military Science, 1.	(Military, VIII.)
Botanical Seminar.	(Botany, XVIII.)
Thesis, required, 1.	

GENERAL AND DOMESTIC SCIENCE.

(For Women Only.)

ACADEMIC YEAR.

FIRST TERM.

Algebra, 5 .	(Mathematics, I.)
English, 5, *or*	(English, I.)
*Latin, 5, *or*	(Latin, I.)
*German, 5.	(Languages, V.)
History, 5.	(History, I.)

Elocution, 2.	(Elocution, I.)
Drawing, 2.	(Mechanical Engineering, XIX.)

SECOND TERM.

Algebra, 5.	(Mathematics, II or III.)
Plane Geometry, 5.	(Mathematics, V.)
Elementary Botany, 2.	(Botany, I.)
Elementary Rhetoric, 5, *or*	(English, II.)
*Latin, 5, *or*	(Latin, II.)
*German, 5.	(Languages, VI.)
History, 3.	(History, II.)

FRESHMAN YEAR.

FIRST TERM.

Advanced Algebra, 5.	(Mathematics, IV.)
Botany, Ecology, 2.	(Botany, II.)
**Latin, 5, *or*	(Latin, I or III.)
**German, 5, *or*	(Languages, V or VII.)
French, 5.	(Languages, I.)
Physiography, 3.	(Geology, I.)
Sewing, 1.	(Domestic Economy, I.)
Advanced Rhetoric, 5.	(English, III.)
Library Work, 4 hours.	(Library I.)

SECOND TERM.

Solid Geometry and Plane Trigonometry, 5.	(Mathematics, VI.)
Histology, 4.	(Botany, III.)
Latin, 5, *or*	(Latin, II or IV.)
German, 5, *or*	(Languages, VI or VIII.)
French, 5.	(Languages, II.)
***Entomology, 2.	(Zoology, I.)
***Horticulture, 3.	(Horticulture, I.)

*Latin or German may be taken only by those students who can show to the Professor of Rhetoric satisfactory evidence of proficiency in the English of the Academic year.

**Beginning or Advanced Latin or German according to the preparation of the student.

***Optional, but required of students who expect to take further work in the respective lines.

Hygiene and Cooking, 2.	(Domestic Economics, II.)
Elocution, 1.	(Elocution, II.)
Composition, 1.	(English, IV.)
Library Work, 4 hours.	(Library II.)

SOPHOMORE YEAR.

FIRST TERM.

Latin, 4, *or*	(Latin, V.)
German, 4, *or*	(Languages, VII or IX.)
French, 4.	(Languages, III.)
Cooking and House Sanitation, 2.	(Domestic Economy, III.)
Composition, 1.	(English, V.)

Choice of not less than eight hours per week from the following subjects; studies omitted may be taken as electives in the Junior or Senior years:

Cryptogamic Botany, 4.	(Botany, IV.)
Physics, 5.	(Physics, I.)
Analytical Geometry, 5.	(Mathematics, VIII.)
Vertebrate Zoology, 4.	(Zoology, II.)
Greenhouse Management, 2.	(Horticulture, III.)

SECOND TERM.

Latin, 4, *or*	(Latin, VI.)
German, 4, *or*	(Languages, VIII.)
French, 4.	(Languages, IV.)
Garment Work, 1.	(Domestic Economy, IV.)
Elocution, 2.	(Elocution, VII.)
Composition, 1.	(English, VI.)

Choice of not less than eight hours per week from the following subjects; studies omitted may be taken as electives in the Junior or Senior years:

Chemistry, 8.	(Chemistry, II.)
Physics, .5	(Physics, II.)
Calculus, 5.	(Mathematics, IX.)
Invertebrate Zoology, 4.	(Zoology, III.)

JUNIOR YEAR.

FIRST TERM.

Floriculture, 2.	(Horticulture, XI.)
Differential Equations, 3.	(Mathematics, X.)
Advanced Cryptogamic Botany, 2.	(Botany, VI.)
Economic Botany, 2.	(Botany, X.)
Chemistry, 5.	(Chemistry, V.)
Political Economy, 5.	(Economic Science, I.)
English Literature, 3.	(Literature, I.)
Entomology, 5.	(Zoology, IV.)
Debating, 1.	(English, VII.)
Elocution, 2.	(Elocution, III.)
*French, 5, *or*	(Languages, I.)
German, 5.	(Languages, V.)
Physical Laboratory, 1.	(Physics, XIV.)
Dressmaking, 1.	(Domestic Economy, V.)

SECOND TERM.

Advanced Mathematics, 3.	(Mathematics, XI.)
Ferns, 3.	(Botany, XVII.)
Bacteriology, 2.	(Botany, VII.)
Systematic Botany, 3 *or* 5.	(Botany, XV.)
Political Economy, 5.	(Economic Science, II.)
Embryology, 3 *to* 5.	(Zoology, V.)
Advanced Entomology, 3 *to* 5.	(Zoology, IX.)
French, 5, *or*	(Languages, II.)
German, 5.	(Languages, VI.)
Organic Chemistry, 5.	(Chemistry, IX.)
Debating, 1.	(English, VIII.)
English Literature, 5.	(Literature, II.)
Pomology, 3.	(Horticulture, IV.)
Olericulture, 2.	(Horticulture, V.)
Cooking, 1.	(Domestic Economy, VI.)
Dressmaking, 1.	(Domestic Economy, VII.)
Elocution, 2.	(Elocution, IV.)
Public Speaking, required, 1.	(Elocution, VIII.)

*Beginning French or German, elective, for those students who did not elect modern languages in the Academic or Freshman year.

SENIOR YEAR.

FIRST TERM.

Political Economy, 3.	(Economic Science, III.)
Dairying, 3.	(Agriculture, VII.)
Elocution, 2.	(Elocution, V.)
Geology, 5.	(Geology, II.)
French, 4, *or*	(Languages, III.)
German, 4.	(Languages, VII.)
Cooking and Household Economics, 1.	(Domestic Economy, VII.)
History, Development of United States, 3.	(History, III.)
Fiction, 3.	(Literature, III.)
Psychology, 5.	(Psychology, I.)
Agrostology, 2.	(Botany, XIII.)
Vegetable Pathology, 2 .	(Botany, V.)
Botanical Seminar, 1.	(Botany, XVIII.)
Chemistry of the Household, 1.	(Chemistry, XVI.)
One Oration Required.	(Elocution, IX.)

SECOND TERM.

Astronomy, 5.	(Physics, VII.)
Drafting of Patterns, 1.	(Domestic Economy, VIII.)
French, 4, *or*	(Languages, IV.)
German, 4.	(Languages, VIII.)
Geology, 5.	(Geology, IV.)
Vegetable Physiology, 2.	(Botany, XI.)
Elocution, 1.	(Elocution, VI.)
History of Civilization, 5.	(History, IV.)
American Literature, 3.	(Literature, IV.)
Horticulture, 3.	(Horticulture, VIII and IX.)
Ethics, 3.	(Psychology, II.)
Advanced Bacteriology, 3.	(Botany, VIII.)
Evolution of Animals, 1.	(Zoology, VI.)
Evolution of Plants, 1.	(Botany, XV.)
Botanical Seminar, 1.	(Botany, XVIII.)
Thesis required, 1.	

DEPARTMENT OF MATHEMATICS.

EDGAR WILLIAM STANTON, PROFESSOR.

MISS ROBERTS, MR. PATTENGILL, MISS COLPITTS, ASSISTANTS.

The work of the Department of Mathematics is directed to the following ends:

(1) *The Development of Intellectual Strength.*—Such a degree of thoroughness is required as awakens interest and stimulates to earnest effort. The work is so arranged as to compel the student to abandon the mere mechanical methods of reaching results. He can make little or no progress except through the mastery of principles and methods; and in their application there is demanded of him a high degree of ingenuity, care and courage. He is subjected to the continuous discipline of holding details in mind, comparing facts, drawing conclusions and advancing to the discovery of new truth. He learns to think, judge, originate, and through his mathematical training gains mental strength.

(2) *Accuracy in Presentation of Mathematical Truths.*—The student is required not only to think clearly, but to put his thought into concise and precise English. In the explanation of examples he is asked to bring out and emphasize the principles involved, dealing in detail with such equations only as are necessary to this purpose. In the solution of problems an analysis of statement and equation must be given, definitions and theorems must be stated clearly and accurately and in the demonstration of propositions the use of correct language is considered as secondary only to the employment of correct logic.

(3) *The acquirement of such Command of the Subject Matter of Mathematics as will make it a Valuable Instrument in Higher Scientific and Technical Study.*—To this end an effort is made to eradicate from the student's mind the idea entertained by many, that mathematical truths are learned simply to be forgotten, and to awaken in its place an earnest desire to obtain a comprehensive and abiding

knowledge of the essential facts of the science. Thoroughness in daily recitation is demanded, frequent reviews are given and final credits are made to depend largely upon the student's grasp of principles and the readiness and accuracy with which he performs the simple and the complex operations involved in their application. Each branch as it is taken up is so presented as to require the constant employment of the principles and facts of the preceding mathematical studies. The department aims in this way to give the student such a degree of mathematical maturity and self-reliant mastery as will enable him to use his mathematical knowledge with profit either in advanced collegiate work or as an instructor in our high schools and academies.

In the engineering courses, algebra, geometry, trigonometry, analytical geometry and calculus are required studies; in the other four courses, algebra, geometry and trigonometry are required, while the advanced mathematical work is either optional or elective.

The following are the several courses in Mathematics:

COURSE I.—*Algebra to Involution.*—It is expected that students entering this course will have such knowledge of elementary algebra to simple equations as may be obtained by thorough work in the high school. If the student's preparation is in excess of this requirement it will be greatly to his advantage.

The subjects included in the review and advance work of this course are those which generally precede involution in any standard text. They are treated, however, in an exhaustive manner and the examples and problems given are more difficult than those found in the ordinary textbook. Special stress is laid upon the statement of definitions and the demonstration of principles.

COURSE II.—*From Involution to Ratio and Proportion.*—This course is open to those who have completed Course I. The following subjects are studied: Involution of monomials and polynomials; evolution, including the consideration of the higher roots of polynomials, and rules for determining the roots of numbers based upon the algebraic

method of extracting roots; radicals, including the fundamental operations, involution, evolution, rationalization, imaginary quantities, extracting the square root of binomial surds and the solution of equations involving radicals; pure and affected quadratics; equations solved like quadratics; and simultaneous quadratic equations. Frequent written reviews are given covering the work in this course and Course I.

At the completion of this course students are expected to have such grasp of algebra through quadratics as will enable them to handle its principles up to this point without error and to perform the operations required, with rapidity and accuracy.

COURSE III.—*Algebra to Ratio and Proportion.*—This course covers practically the same subjects as those enumerated in Courses I and II. Much of the work, however, is taken in rapid review, only one term being devoted to the combined courses. The object aimed at is not elementary instruction in the science, but a wider grasp of principles and familiarity with their application in more difficult fields. Many of the examples assigned are such as are met with in the higher mathematics. The student is thus introduced to a quality of work demanding a broad view of principles and methods and a marked degree of skill in algebraic manipulation.

The course should be undertaken by those only who have already had large experience in algebraic work and who have developed considerable strength in this study. The minimum requirement for entrance is a thorough knowledge of algebra through simple equations. The course is especially intended, however, for students who have completed algebra in the high school and who need to give the subject a thorough review before entering upon advanced work. Admission is secured by examination or upon the certificate of the proper officer of an accredited high school.

COURSE IV.—*Advanced Algebra Completed.*—The subjects treated in this course are ratio and proportion, variation, arithmetical progression, geometrical progression, harmon-

ical progression, the binomial theorem, convergency and divergency of series, theorem of undetermined coefficients, including partial fractions and reversion of series, principles and use of logarithms, permutations and combinations, probability and the theory of equations.

The course is open to students of the college who have taken Courses I and II or Course III; also to graduates of the fully accredited high schools who furnish the proper certificates. The first ten days of the time alloted to the course is devoted to a review of algebra up to and including quadratics. Students who fail to stand the test of this review will be assigned to such work as they are prepared to undertake.

Graduates of accredited schools are earnestly urged to carefully review their student work in algebra before entering this course. The sample questions printed elsewhere in this catalogue give a good idea of the knowledge of the subject needed. The department will gladly unite with the student and his school principal in arranging to test the thoroughness of his home review; such test can be given in connection with the work of the high school and, if satisfactory to the department, will be accepted in lieu of the review test at the College. The student can then begin his advanced work without delay. Students designing to take the review here must be present promptly at the opening of the term. Correspondence regarding this whole matter is cordially invited.

Students not graduates of the fully accredited schools will be admitted to this course upon passing a satisfactory examination upon the work covered by Course III. As stated under "Requirements for Admission" arrangements can be made with principals of high schools or county superintendents to conduct such examinations. The principal of any school desiring to test the ability of his students to enter upon the work of this course will be furnished, upon request, a list of examination questions. The department will be pleased to mark the examination papers and enter upon its records as accredited students in the mathematical department the names of all students

who show that they are prepared to take up the work with success.

COURSE V.—*Plane Geometry.*—The topics included in this course are those usually treated in a standard text. They include the fundamental definitions and axioms, theorems relating to rectilinear figures and the circle, measurement of angles; doctrine of limits; theory of proportion; similar polygons; comparison and measurement of the surfaces of rectilinear figures; measurement of the circle, and geometrical construction of plane figures. The text book used is Chauvenet. The proofs outlined in the text must be fully amplified; definitions must be stated with precision; authority cited must be given in full and the logical steps in demonstration must be so arranged and presented as to constitute a complete and rigid proof. The student must understand each proposition and be able to state the demonstration in concise geometric language. Special emphasis will be laid upon the demonstration of original exercises. The course is open to those who furnish the head of the department with satisfactory evidence that they have a thorough knowledge of the subjects in Course I.

COURSE VI.—(a) *Solid and Spherical Geometry.*—This course is open to those who have met the requirements for admission to the mathematics of the Freshman Year. A week is given at the beginning to a review of plane geometry, one day being devoted to each book. Students are required to write out or demonstrate orally such propositions as may be assigned, using in preparation the text book studied in the preparatory school. Looking forward to this work the students immediately before leaving home should carefully go over the whole subject of plane geometry. Those who show in the week's review a satisfactory knowledge of definitions and ability to handle successfully advanced geometric work will be assigned to the classes in solid geometry. The subjects considered in the remainder of the course will be the properties of planes, of diedral and polyedral angles, of prisms,

of pyramids and other polyedrons, of cylinders, cones and spheres, of spherical triangles and spherical polygons.

(b) *Plane Trigonometry.*—Algebra and geometry are essential preliminary studies. The subjects investigated are definitions; positive and negative angles; circular measure of angles; operations upon angles; functions of angles, their relations and varying values; determination of values of the functions of particular angles; functions of different angles expressed in terms of those of a basal angle; derivation and reduction of trigonometric formulas; solution of right and oblique triangles. The points most strongly emphasized are: Care in tracing the trigonometric functions of varying angles in the different quadrants, readiness and skill in the derivation and reduction of trigonometric formulas, and accuracy in the use of logarithmic tables.

Course VII.—*Spherical Trigonometry.*—This work is required in the second term, Junior year, of the Civil Engineering course. It is elective to students in the science and ladies 'courses. Course VI and the studies necessarily preliminary thereto are required for entrance. The spherical right triangle is investigated; triangles of reference are formed and formulas deduced therefrom; Napier's rules are explained; the six different cases arising in the solution of right triangles are discussed and illustrated by numerous examples. Spherical triangles in general are considered; the formulas relating thereto are derived and applied to the solution of examples; interesting problems connected with the celestial sphere are included in the course.

Course VIII.—*Plane Analytic Geometry.*—This subject is taught largely from the standpoint of its value as a disciplinary study. Once the student is impressed with the spirit of its method the beauty of its logic and the excellent field for analytical reasoning it opens up, he will readily find his way to a mastery of the particular facts it reveals. The student is introduced to the subject through a review of the special algebraic, trigonometric and geometric conceptions upon which it is based; these are

applied to the analytic representation of points in a plane and the proposition established that all geometric lines and curves can be represented by equations and their properties and relations discovered by a study of these equations. The line, the circle and the conic sections are in this way most carefully investigated. Examples involving principles are solved and from a knowledge of particulars the student is led to the demonstration of general theorems. The generalized truth is then employed in the development of other truth, and thus the student is given a most excellent drill in both inductive and deductive reasoning. At the same time his needs, as an engineering or scientific student, of a knowledge of the facts of analytic geometry, are fully met. The Analytic Geometry by Tanner and Allen of Cornell University is used as a text.

Course IX.—*Differential and Integral Calculus.*—All preceding mathematical work should be completed before this course is undertaken. Calculus bears to that work the double relation that, while it is based upon it and cannot be pursued successfully except as the work has been well mastered, it on the other hand furnishes a most excellent opportunity for a general review of the preceding mathematical studies and gives to all that has gone before a significance and value which it would otherwise lack. It is therefore a most important part of any extended and thorough mathematical course. The abstruse principles of this higher method of mathematical investigation are explained upon the theory of limits. The theory of infinitessimals is also employed. Instruction is given by daily recitations with a review of the week's work each Friday. In differential calculus the rules of differentiation, expansion of functions, indeterminate forms, tangents, normals and asymptotes, direction of curvature, points of inflection, radius of curvature, order of contact, the osculating circle, singular points and maxima and minima of functions are studied. In integral calculus much time is spent in acquiring a usable knowledge of the forms of integration. Application of integration is then made to the determination of the lengths of plane curves, areas of

plane surfaces and surfaces of revolution, volumes of solids of revolution and other solids.

COURSE X.—*Differential Equations.*—This course is required of electrical engineers and is open to all students of the College who have completed Course IX. The work covered by it may be considered as supplementary to integral calculus. The subjects treated are the formation of differential equations; solution of equations of the first order with applications to geometry, mechanics and physics; methods of handling linear equations with constant and variable coefficients; exact differential equations; integration in series; equations of the second order with geometrical, mechanical and physical applications; ordinary differential equations with more than two variables; partial differential equations of the different orders. The text used is Murray's "Differential Equations."

COURSE XI.—This course deals with the application of differential calculus to the discussion of the properties of curves. It treats also of the analytic methods of representing a point in space, the relation of different points, transferring the reference from one set of axes to another, locus of equations of two and three variables, surfaces of revolution, planes, straight lines and quadratic surfaces. The principles involved are illustrated by numerous examples.

COURSES DESIGNED FOR AGRICULTURAL STUDENTS ONLY.

COURSE XII.—*Algebra through Quadratics.*—Given first term, Freshman year. The course covers the work in Course III. To complete it successfully in the time allowed the student should have knowledge of at least the fundamental operations. It will be greatly to his advantage if he has taken the work as far as involution.

COURSE XIII.—*Algebra; Permutations and Combinations, Binomial Theorem and Logarithms; Plane Geometry.*—Given second term, Freshman year. Six weeks is devoted to

algebra and the remainder of the term to plane geometry. The work in algebra includes permutations and combinations; the binomial theorem and logarithms. The geometry covers the same ground as Course V.

COURSE VI.—*Solid Geometry and Plane Trigonometry.*—Given in first term, Sophomore year.

Students who have had considerable experience in algebra and who enter the Agricultural course in the spring can begin their mathematical studies at once and pursue them in regular order until they are completed, taking the work as follows:

Spring term: Course III.

Fall term: A special class will be formed which will complete the work in algebra and take plane geometry.

Second spring term: Course VI.

THE DEPARTMENT OF PHYSICS.

LOUIS BEVIER SPINNEY, PROFESSOR.

MR. TUTTLE, ASSISTANT.

Including the photographic rooms, the repair shop and the dynamo laboratory for electrical engineering, this department occupies ten rooms. The lecture room, the office rooms, the general physical laboratory, the apparatus room and the pnotometry room are located on the second floor of Chemical and Physical Hall. The dynamo room is in the basement of the building and on the third floor are the repair shop and photographic rooms. The battery room is located in the basement of West Cottage.

The lecture room has a seating capacity of seventy-five, is well lighted and furnished with a system of darkening shutters for the windows and a large permanent lantern screen, to facilitate demonstration work. At the lecture room table are electric, gas and water connections, placing at the disposal of the lecturer a water pressure of fifty pounds per square inch, and electric currents from storage batteries, and direct or alternating current dynamos.

The department has a good equipment in apparatus for demonstration purposes, which is stored in an apparatus room adjoining the lecture room. This last named room has recently been fitted with an excellent system of cases for the proper classification and protection of apparatus.

The general laboratory room is large and well lighted and is equipped with heavy oak tables and stone piers for the support of laboratory apparatus. Convenient electric gas and water connections are provided. A very serviceable equipment, in the apparatus used in general physical laboratory work, is furnished. Among other apparatus may be mentioned, a laboratory clock, with electric connections, a chronograph, a reversion pendulum, two torsion pendulums for the experimental determination of "moment of inertia" and the "cœfficient of simple rigidity," a physical pendulum, apparatus for the determination of the "intensity of gravity" by observations on a body rolling on an inclined plane, analytical balances, Jolly's balance, hydrostatic balance, apparatus for the determination of "Young's Modulus" by stretching and by bending, apparatus for the cœfficient of linear expansion, a cathetometer, an optical bench, telescopes and microscopes, spectroscopes, a saccharimeter, hydrometers, thermometers, barometers, galvanometers, Wheatstones bridges, "testing apparatus," electro-calorimeters, silver, copper and water-voltameters, etc.

The photometry room is fitted with a twelve-foot Bunsen photometer-bench and is provided with electric connections to facilitate the photometric study of glow lamps.

The dynamo room is equipped with sixteen experimental dynamos, including arc machines and direct and alternating current machinery of various types together with switch-boards and an extended system of electric connections. An equipment in ammeters, voltmeters, wattmeters, transformers, dynamometers, etc., is also provided.

The repair shop is fitted with two foot lathes, a set of machinist's and carpenter's tools and a stock of shop

supplies. This room is used for the repair and manufacture of apparatus.

The photographic laboratory is equipped with cameras and other appliances, dark-rooms, skylights, screens and back-grounds for portrait and copying work, and water facilities. The equipment enables the carrying forward of a very practical course in photography in its various applications.

The following courses are offered by the department:

COURSE III.—*Mechanics and Heat.*—First term, and

COURSE IV.—*Light and Sound, and Electricity and Magnetism.*—Second Term. Two lectures and three recitations per week. Mathematics IV, V and VI required. Course III is a prerequisite of Course IV.

This course is designed for engineering students, although it is open to others who are properly prepared for the work. Much stress is placed upon the fundamental principles of the work and in addition thereto a thorough study is made of vector quantities and their graphical treatment.

A view of the subject from a mathematical standpoint is emphasized and the student is urged to familiarize himself with the theoretical side of the question, as it is believed such a foundation is very helpful if not absolutely essential to the work which follows. Text-book, Hastings & Beach, "General Physics." Professor Spinney.

COURSE V.—*Elementary Work in Mechanics and Heat.*—For students in Agriculture. Three hours per week. First term.

In Mechanics and Heat special attention is given to force action and the expenditure of energy. Energy transformation, heats of fusion and vaporization and specific heats are emphasized, keeping in view the bearing of the various principles upon practical agriculture. Professor Spinney and Mr. Tuttle.

COURSE VI.—*Electricity and Magnetism.*—Three hours

per week. First Term. Physics III and IV and Mathematics IX required.

Lectures, recitations and problem work. A course in the elementary theory of electricity and magnetism. Discussion of measuring instruments and laboratory methods of measuring the various electrical quantities. Text-book, Nichols and Franklin, "Elements of Physics," Vol. II. Professor Lanphear.

COURSE IX.—*Theory and Practice of Photography.*—One lecture and one afternoon per week. First term. Open to upper classmen only, upon recommendation by the head of the department in which the student takes his major work.

In the lecture work is given a discussion of the optics and chemistry of photography. The manipulation of the negative and positive under the various processes to which it is subjected is also presented and the laboratory work is planned to give the student some skill in carrying forward the various methods of practical photography. The student is given practice in developing over and under exposed negatives, in copying and enlarging work, etc.

The lecture work on the chemistry of the various operations is based largely upon Meldola's "Chemistry of Photography." Professor Lanphear.

COURSE X.—*Dynamo Electric Machinery.*—Four hours per week. Second term. Prerequisite: Physics VI. Professor Lanphear.

COURSE XI.—*Alternating Currents.*—Four hours per week. First term. Physics X required. Professor Spinney.

COURSE XII.—*Applied Electricity.*—Four lectures per week. Second term. Physics XI required. Professor Spinney.

COURSE XIV.—*General Physical Laboratory.*—One or two afternoons per week. First term, or

COURSE XV.—One or two afternoons per week, Second term. Measurement of length, mass and time, determina-

tion of physical constants, use of the barometer, thermometry, calorimetry, etc. Professor Spinney and Mr. Tuttle.

COURSE XVI.—*Physical Laboratory, Elementary Electrical Measurements.*—Two afternoons per week. First term, or

COURSE XVII.—Two afternoons per week. Second term.

The measurement of the electro-motive force and internal resistance of primary and secondary batteries, the use of Wheatstone's bridge, measurement of current, determination of galvanometer constants, high resistance measurements and insulation tests, etc. Professor Spinney and Mr. Tuttle.

COURSE XVIII.—*Physical Laboratory, Electrical Testing.* —Two afternoons per week. First term, or

COURSE XIX.—Two afternoons per week. Second term. Professor Spinney and Mr. Tuttle.

COURSE XX.—*Physical Laboratory,*—Dynamo, motor and commercial plant testing. Three afternoons per week. First term. Professor Lanphear.

COURSE XXI.—*Physical Laboratory.*—Laboratory study of alternating currents, two afternoons per week, second term, Senior year. Professor Lanphear.

COURSE XXII.—*Electric Circuits.*—Two lectures per week. Second term. Physics VI required. Professor Lanphear.

COURSE XXIII.—*Electrical Designing.*—Batteries, commercial ammeters, voltmeters, wattmeters, etc. One afternoon per week, second term, Junior year and

COURSE XXIV.—*Electrical Designing.*—One afternoon per week. First term, Senior year. The design of dynamos, motors, transformers, etc. Professor Lanphear.

COURSE XXV.—*Electrical Designing.*—Three afternoons per week. Second term, Senior year. Continuation of Course XXIV. Professor Lanphear.

COURSE XXV.—*Electrical Designing.*—The design of dynamos, motors, transformers, etc. Three afternoons per

week. Second term, Senior year. Professor Spinney and Mr. Reed.

COURSE XXVI.—Thesis in Electrical Engineering begun, and

COURSE XXVII.—Thesis in Electrical Engineering, finished. Total equivalent of four hours per week for one term. Professor Spinney.

COURSE XXVIII.—Thesis in Physics. Professor Spinney.

COURSE XXIX.—*Electrical Seminar.*—One hour per week first term and

COURSE XXX.—*Electrical Seminar.*—One hour per week, second term. A continuation of Course XXIX. Professor Spinney.

For a discussion of Courses X to XIII, XVIII to XXVII and XXIX and XXX, see the Course in Electrical Engineering.

The department offers thesis work in general physics, in heat, in light and sound and in electricity and magnetism to students in other than in the engineering courses.

Courses III and IV and Courses X to XXV are designated especially for engineering students. Courses III, IV, XIV, XV, XVI and XVII are however open to other students as electives.

Students in the Courses in Science who take Courses III and IV are advised to supplement that work by electing Physics XIV or XV and XVI or XVII in the Junior year.

A fee of $5.00 per term is charged for any two hour laboratory course.

If the student elects but one hour the fee is $3.00.

The fee for Course IX is $3.00.

DEPARTMENT OF CHEMISTRY.

ALFRED ALLEN BENNETT, PROFESSOR.

MISS PLACEWAY AND MISS BEARDSHEAR, ASSISTANTS.

The study of Chemistry begins in the Sophomore year with all students except those in the Veterinary Depart-

ment, who begin their work the First term of the first year.

METHODS AND OBJECT OF INSTRUCTION.

The aim of the instruction in Chemistry is to develop in the student the inductive and experimental method of study, to excite in him an appreciation and love for true experimentation and to train his powers for inductive thinking. The method of study is, therefore, distinctively the laboratory method. On the average, the student employs two hours of time in laboratory study for every hour of recitation. This proportion of time for the two divisions of work is especially carried out in the earlier part of the class study. The class room work aims to fix in the mind of the student chemical principles and facts based upon what has been learned by the actual handling and study of chemical substances.

The work is arranged in *courses*, the *course* referring to the pursuit of a division of the subject for *one term* without regard to the number of hours per week that may be devoted to it. *Three hours* of laboratory study is equivalent to *one* hour of recitation.

DESCRIPTION OF COURSES OF STUDY.

The work is conveniently grouped under the following general heads: (a) General and Descriptive Chemistry; (b) Analytical Chemistry, Qualitative and Quantitative Analysis; (c) Organic Chemistry; (d) Studies in Applied Chemistry.

(a) *General and Descriptive Chemistry* includes an elementary study of the non-metallic and metallic elements, their history, occurence, preparation, properties and their principal compounds. In order better to train his powers of observation the student is required to describe the apparatus used and the phenomena produced, and to trace the relation of the results obtained to laws and principles

which underlie them. The different courses in General and Descriptive Chemistry are arranged to meet, as far as is practicable, the special needs of the students of the various departments. However, it is recognized that at this stage of the work the *Science of Chemistry* is the student's most practical acquisition.

(b) *Analytical Chemistry*, both *Qualitative* and *Quantitative*, is taken up in an elementary way at first and may be followed by courses in more advanced work. As soon as the student has acquired sufficient elementary knowledge of methods of analysis his attention is directed to the analysis of more or less complex mineral and manufactured substances. In the recitations, methods of analysis are described and discussed and the study of the theoretical chemistry carried forward. In this work, courses of study are arranged for graduate as well as for undergraduate students.

(c) In *Organic Chemistry*, courses are offered for the first degree and also as major and minor for graduate students.

The course required of the students of the *Veterinary Department* is of an elementary nature and is intended to give a sufficient knowledge of the subject to lay the foundation for the study of *Physiolygical Chemistry* which follows. The latter course considers the chemical changes going on in the living animal body; the essential composition of foods and the changes through which they pass in the animal economy; the chemistry of the secretion and excretion. The laboratory study is devoted to the three principal food constituents and to urine analysis.

To undergraduate students in the *Division of Science* is given a fairly complete outline of the theory of the structure and formation of organic compounds, but special attention is given to those compounds that are of commercial importance. In the laboratory the student prepares many of the more important manufactured organic substances, such as alcohol and soaps, and makes a special study of vinegars, sugar, petroleum and its products, glycerine, etc.

With this work as a foundation the *graduate student* selects some feature or features for more complete study. The amount and character of the work is left for arrangement between the individual and the head of the department. However, this will embrace such work as the analysis and study of foods, oils, fats, and the methods of preparation, purification, and adulteration of commercial organic substances.

(d) It is recognized among persons whose opinions are worthy of consideration that the application of any science to the problems of life can be profitably taken up by the student only after a thorough grounding in the principles upon which the science rests. The purpose of the preliminary courses in this subject is to give this training as completely as possible. The work in *Applied Chemistry* is, in the nature of the case, essentially quantitative analysis and consists of courses in *Fuel and Gas Analysis; Blowpiping and Assaying; Metallurgy; Chemistry of the Household; Quantitave Chemistry,* as applied to ores, iron, steel, foods, water analysis, and the application of electricity to quantitative analysis.

The course in *Fuel and Gas Analysis* will consist of the study of solid, liquid and gaseous fuels, in reference to their composition, and to their relative economic values. The student may devote the time of this course, principally, to technical analysis. Although the work is largely done in the laboratory it will be supplemented by lectures and recitations. The standard forms of apparatus will be used.

The principles and methods of quantitative analysis learned in the elementary course will be applied in the advanced work to the analysis of the various organic and inorganic substances, such as foods, iron and steel. The application of the facts of Electro-chemistry to the quantitative analysis of ores, and in the manufacture of chemicals will be studied in an elementary manner.

Quantitative Analysis by the "fire methods" is applied to gold, silver, copper and lead ores. This work is introduced by a blowpipe study of minerals, and is intended

to support and supplement the subject of Descriptive Mineralogy and Crystallography which are studied in the Department of Geology.

The study of *Metallurgy* includes the study of fuels used in metallurgical processes, ores and furnace methods for producing the useful metals. The work is carried on by means of lectures, text-book study, charts, and the reading of standard works.

The Chemistry of the Household considers the elementary chemistry of the principal food materials, changes produced in them during cooking and digestion, of cleaning and of adulteration of the chief food substances.

The work in *Water Analysis* covers a study of the methods employed, namely, the so-called mineral and sanitary analysis, and the interpretation of these results, especially from the standpoint of the household, and for use in boilers in the production of steam. Methods of purification of water for these purposes will receive attention.

COURSES OF INSTRUCTION.

FIRST TERM.

COURSE I.—*Elementary Inorganic Chemistry.*—Recitations *two hours.* Laboratory practice, *one afternoon.* Veterinarians. Freshmen.

COURSE III.—*General Chemistry.*—Recitations, *three hours.* Laboratory practice, *two afternoons.* Engineers. Sophomores.

COURSE V.—*Qualitative Analysis.*—Recitations, *three hours.* Laboratory practice, *two afternoons.* Continuation of Course II. Junior or Senior year.

COURSE X.—*Elementary Organic Chemistry.*—Lectures, *two hours.* For students in the Veterinary Department only. Junior year.

COURSE XI.—*Quantitative Analysis.* Recitations, *two hours.* Laboratory practice, *three hours.* Senior year. Must be preceded by Courses II and V or III and VI.

COURSE XIV.—*Organic Chemistry. Five hours.* A continuation of Course IX. Work subject to arrangement by head of department and student. Senior year, or as a major or minor graduate study.

COURSE XVI.—*Chemistry of the Household. Sixteen lectures.* Senior year. Must be preceded by Courses II, V and IX. Offered to students of science as related to the industries, and in domestic science.

COURSE XVII.—*Fuel and Gas Analysis. Three hours.* Senior year. Elective for students of Division of Science. Courses II, V and IX, required.

COURSE XVIII.—*Electro-chemistry. Three hours.* Senior year. Elective for students of Division of Science. Courses II and V required.

SECOND TERM.

COURSE II.—*General Chemistry.* Recitations, *three hours.* Laboratory practice, *two afternoons.* Sophomore year. Division of Science Courses.

COURSE IV.—*General Chemistry* (Metals.) Recitations, *two hours.* Laboratory practice, *one afternoon.* Freshmen. Veterinary Science students only.

COURSE VI.—*Qualitative Analysis.* Recitations, *three hours.* Laboratory practice, *two afternoons.* Continuation of Course III.

COURSE VII.—*Blowpipe Analysis.* Recitations, *two,* and laboratory practice *three hours* for one-half semester. Required of Mining Engineering students, and elective for students of Division of Science. Junior year. Courses II and V, or III and VI, required.

COURSE VIII. *Assaying.* Recitations, *two hours,* and laboratory practice, *three afternoons* for one-half semester. Junior year. Required of Mining Engineering students. Elective for students in Division of Science. Junior year. Courses II and V, or III and VI, required.

COURSE IX.—*Organic Chemistry.* Recitations, *four hours.* Laboratory practice, *one afternoon.* Junior or Senior years. Must be preceded by Courses II and V.

COURSE XII.—*Metallurgy.* Lectures and recitations, *three hours.* Senior year. Required of Mining Engineering students. Elective for students in Division of Science. Courses II, V, VII and VIII, required.

COURSE XIII.—*Physiological Chemistry.* Recitations, *two hours.* Laboratory practice, *one afternoon.* Senior year. Required of students in Veterinary Department. Elective in Division of Science. Courses II, V and IX, required, when elected.

COURSE XV.—*Analysis of Foods. Three hours.* Senior year. Elective for students in Division of Science. Courses II, V and IX, required.

COURSE XIX.—*Water Analysis. Three hours.* Senior year. Elective for students in Division of Science. Courses II, V and XI, required.

COURSE XX.—*Special Work in Chemistry for the Preparation of a Graduate Thesis.*—The subject is usually selected along the line of applied chemistry.

Graduate students will be provided with work in Organic and Inorganic Chemistry extending through two years is desired.

It is open as a major subject to graduates of this and other colleges of equal standing who have pursued the study of chemistry for two years and who are by this prepared to carry on independent work in the various directions that may be arranged by them and the head of the department. The courses of study will be along the lines of Applied or Industrial Chemistry with a sufficient ground work of theoretical study to give a rational explanation and conception of the processes involved. The work will include advanced analytical and synthetical chemistry, i. e., a study of the methods of chemical analysis and of the prep aration of organic and inorganic compounds of industrial and commercial importance. The graduate student will select work along some one of these general lines of study and will devote his time to this, supporting it by other necessary collateral study, and such research in the literature

of the subject as the library facilities will permit. A good reading knowledge of the German language will be essential to good progress in the prosecution of the work. Minor subjects in this department will be arranged so as to help as much as is possible the major subjects selected in the other departments.

EQUIPMENT AND ACCOMMODATIONS.

The chemical department occupies two floors of the Physical Science building. This space is divided into eleven rooms, six of which are laboratories, the remainder being lecture, office, balance and store rooms.

The laboratories contain working tables for one hundred and twenty students. In connection with each table in the main laboratories there are two lockers, and by an arrangement of classes the accommodation of the laboratories is increased to over two hundred.

The assaying laboratory is fitted with slate-topped tables, for the accommodation of sixteen students. These tables are supplied with gas and air blast. This room also contains a complete supply of muffle and crucible furnaces for dry assaying. Gasoline furnaces are employed, since they enable work to be done more rapidly and in less space than the older types of coke or other solid fuel furnaces. For quantitative chemical work the department is well supplied with accurate sets of weights and balances.

The department is amply equipped with apparatus and chemicals for all of the work outlined in the courses of study offered.

Persons desiring to prepare themselves to become teachers of chemistry, analytical chemists, or those seeking a preparation for the study of medicine will find here good facilities for study. The expenses are only sufficient to cover the actual cost of the material used in the prosecution of the work.

DEPARTMENT OF BOTANY.

LOUIS HERMANN PAMMEL, PROFESSOR.

MISS PADDOCK AND MR. FAUROT, ASSISTANTS.

EQUIPMENT.—The Department of Botany has rooms on the first and basement floors of Main Building. The general botanical laboratory has an east exposure, and is about 20x30 feet; contains five large laboratory tables, and ten individual research tables. The general lecture room has a seating capacity for one hundred students, provided with charts for the purpose of illustration, and various mounted specimens in glass frames that contain weeds and diseases of plants. Two other rooms in this building are used as a laboratory for advanced students and an office room. The collection is mostly contained in these two rooms. In the basement there are two rooms devoted to bacteriological work in which the various forms of apparatus are kept, such as Arnold's steam sterilizer, Koch's steam sterilizer, dry oven for dry sterilization, blood serum sterilizer, platinum needles, plate holders for plates, glass benches for support of plates, Petri dishes, culture dishes, leveling tripod, incubator and thermo-regulator. All the laboratories are fully equipped for doing general and advanced work in botany.

The Department of Botany offers excellent facilities, not only to the undergraduate students, but to the graduate students along the lines of economic botany.

The various collections of the department now amount to about 30,000 specimens. The herbarium is very full in plants from Iowa and the Mississippi Valley, besides having a large number of plants from the eastern states, California and Europe. The collection may be divided into the general phanerogomic herbarium which was started by Dr. C. E. Bessey and continued by Dr. Halsted, to which numerous specimens have been added during the last few years.

There is an excellent collection of grasses. The college is rapidly replacing the material lost by fire. The valuable Parry Collection was saved.

THE PARRY COLLECTION.—This was purchased at a considerable expense from Mrs. Parry. This collection contains hundreds of new species found by Dr. Parry on his collecting trips, and is especially rich in plants of California, Mexico and the Rock Mountain Region. Many of these specimens were collected before the advent of the railroad. Many of the specimens contained in the collection are type species and are thus invaluable.

THE CRYPTOGAMIC COLLECTION comprises a large number of very valuable exsiccati. It contains, besides the Ravenel Fungi Americani, Exsiccati, a rare collection of dried plants, the now equally rare Ellis' North American Fungi, the Von Thumen Mycotheca Universalis, besides numerous smaller collections.

LIVING MATERIAL.—This department obtains living material from the plants grown by the Department of Agriculture and Horticulture, the grounds of the latter being very rich in ligneous plants from Europe, Asia and America.

COURSE I.—*Elementary Botany.*—This course embraces a study of the morphology of flowering plants, the terms used in descriptive botany and the determination of simple flowering plants. Gray's Lessons and Manual is used as a text accompanied by lectures and specimens designed to illustrate the subject. A collection of fifty specimens of flowering plants is required. Excursions to some convenient point for the purpose of studying the native flora are obligatory. Academic year, second term; required of students in the Division of Agriculture and Division of Science Recitations and laboratory. Two hours.

COURSE II.—*Ecology.*—A course in which the relations of plants to their environment are considered, the relations between insects and flowers, pollination by wind and other agencies. Dissemination of plants by various agencies and the distribution of plants over the earth's surface and factors that influence distribution; plant communities.

Excursions are an essential feature of this course. First term, Freshman year, in Division of Science and Division of Agriculture. Two hours.

COURSE III.—*Histology.*—This course is designed as an elementary one. Since students are unfamiliar with the use of the microscope they are taught the use of the same, beginning with very simple objejcts, such as an air bubble and cotton fiber, then passing on to a study of the cell with its contents, such as starch, protoplasm, nucleus, and crystals. The division of cells and nucleus are studied in light of modern investigations. The laboratory work supplements that of the class-room; the different organs and parts of a plant are taken up, not merely as histological structures but considered from a physiological standpoint. As an illustration, the cuticle, cuticularized and cellulose layers of the epidermal cells of an agave leaf are considered with reference to their significance in preventing transpiration. The absorbing, assimilating, aerating and conducting system are considered in the same way. Lectures, recitations, and laboratory. Freshman year, second term for Division of Science and second term, Sophomore year in Division of Agriculture. Four hours.

COURSE IV.—*Cryptogamic Botany.*—The first term of the Sophomore year is devoted to the study of cryptogams from a systematic standpoint. Special attention is given to "rusts," "smuts" and "mildews." The morphology and life history of the different groups of Cryptogams are considered. Lectures and laboratory, with frequent excursions. Four hours.

COURSE V.—*Vegetable Pathology* comes in the Senior year, in which plant diseases of the farm, garden and horticultural crops are taken up. In this course lectures on the more injurious of the fungous diseases of cultivated plants are considered in a more extended way than is possible in the Sophomore year. The theory of immunity and prevention of diseases, rotation of crops and fungicides are considered. In this course the diseases are treated from the standpoint of the host plant.

COURSE VI.—*Advanced Cryptogamic Botany.*—This course embraces a study of the more important orders of cryptogams, especially with reference to the flora of Iowa. This course is offered to students in the Division of Agriculture and the Division of Science. Frequent excursions are obligatory. Three hours.

COURSE VII.—*Bacteriology* is an elective study for students in the Division of Science, but required of the Junior Veterinary and Junior Agricultural students. The laboratory work consists in studying some of the common germs and bacteriological technique. In the lectures special attention is given to sanitation and means of preventing contagious diseases. Because of the radical difference in many diseases between man and animals the work is taken up in two divisions, one considering its relation to human health and hygiene, and the general subject of making media, sterilization, biology and classification. Text, Abbott's Bacteriology is used. Two hours.

COURSE VIII.—*Advanced Bacteriology.*—This is an elective in the Senior year in which special attention is given to a study of water and micro-organisms. The work is in advance of that done in the Junior year. It is intended especially for persons who intend to enter a professional life either along the lines of sanitary engineering or other professions. Frankland's Micro-organisms of Water, and Muir and Ritchie are used as works of reference. Three hours.

COURSE IX.—*Structural Botany.*—This course begins in the first term of the Freshman year. The work consists of recitations and lectures. The student is expected to become familiar with the morphology of flowering plants and the terms used in descriptive botany. In the study of identification and selection of drugs it is necessary to have a thorough botanical knowledge of general structural botany as well as vegetable histology. Vegetable drugs not only consist of the entire plant but frequently of only parts. In this course the general structure of the plant from the root to reproductive organs, is taken up and

considered. In the laboratory the student takes up the histology of plants especially from the standpoint of pharmacognosy, with a brief survey of the more important plants from a systematic standpoint.

COURSE X.—*Economic Botany.*—In this course special attention is given to a microscopic study of foods. The principal cereals and food plants are studied with reference to their general and minute structure, as it gives to the student a general idea of the nature of vegetable foods as well as the reserve material of plants and the systematic position of our economic plants, where they originated and where chiefly cultivated. Lectures and laboratory work. Two hours.

COURSE XI.—*Vegetable Physiology.*—A course of lectures with demonstrations on the functions of plants, nutrition, growth, movements and reproduction of higher plants. Lectures and recitations. Two hours.

COURSE XII.—*Vegetable Cytology and Microtechnique.*—A study of the cell and its divisions in lower cryptogams and higher plants. The use of reagents and staining, methods of sectioning and mounting. Recitation and laboratory work. Three hours.

COURSE XIII.—*Agrostology.*—This course is an elective one. It is intended to give the student a general idea of some of the more important grasses, not only with reference to their botanical position, but also with reference to their economic uses, especially meadow and pasture grasses; the cereal food products, grasses in medicine, grasses as soil binders, and grasses for lawns and lawn-making. Lectures and laboratory work. Two hours.

COURSE XIV.—*Seeds and Seed Testing.*—A short course of eight laboratories and eight lectures is given on the principal agricultural seeds and their detection in commercial seeds. Their germinative energy and such other features as are important in connection with seed testing. One hour.

COURSE XV.—*General Systematic Phanerogams.*—This course consists of lectures and laboratory work on the more important orders of flowering plants, especially with

reference to the flora of North America. Definite systems of classification, prelinnaean, linnaean, and post linnaean. In the laboratory each student is assigned some special group of plants to work up. The synonymy of the species of plant studied by him are looked up. Frequent excursions are obligatory. Three hours.

COURSE XVI.—*Poisonous Plants.*—The veterinarian is frequently called on to investigate poisoning. He should therefore be familiar with the plants responsible for poisoning live stock. In this course the subject is treated from the historical standpoint, brief reference to the history of toxicology, auto-intoxication, poisoning from ptomaines, toxines and agents responsible for such poisoning. Poisoning by fungi like toadstools, and ergot. Dwelling on the life history of these fungi and the poisons they produce. The rusts and smuts as possible causes of disease. The higher plants are then taken up in a systematic order, calling attention to the poisonous plants in the various orders and means for recognizing these plants. Lectures and laboratory work. Two hours.

COURSE XVII.—*Advanced Cryptogamic Botany. Ferns.*—A course is offered in advanced cryptogamic botany in which only the vascular cryptogams are taken up In this course principal attention will be given to the study of the chief types of ferns in this state and in the United States and the general distribution of ferns and their development. The ferns are frequently cultivated and they are objects of interest to every lover of the study of the science of botany. Three hours.

COURSE XVIII.—*Botanical Seminar.*—There has been organized at the college in connection with botanical work, a Botanical Seminar. Here reviews of recent literature and topics of general interest are considered, each member of the Seminar being assigned a topic to report upon. The subjects are then discussed by the members. There are also special lecturers who consider certain topics related to botany. Seminar meets once a month during the college year. One hour.

COURSE XIX.—*Evolution of Plants.*—A course of lectures dealing with evolution as applied to plants, theories of evolution, heredity, origin of plant life, present and past distribution. One hour.

COURSE XX.—*Botanical Micro-chemistry.*—In this work the student becomes familiar with the microscope and its parts and the structure of cells and the substances contained therein, special attention being given to microchemistry. This work covers essentially the work given in Zimmermann's Botanical Microtechnique. Lecture recitations and laboratory work. Five hours.

COURSE XXI.—*Cytology.*—An advanced post-graduate course in cytology is offered. The student takes up work in advance of that given in Course XII, especial attention being given to developmental studies of higher plants and some of the cryptogams. This study can only be taken as a major in post graduate work, the student also pursues a course of reading along with the laboratory work. Major work.

COURSE XXII.—*Systematic Botany.*—The department offers unusual facilities for doing systematic work, the collection being large and well supplied with type material in the way of Phaenogams from the Rocky Mountain and Pacific Coast. The student taking this course should be sufficiently familiar with the general relations of the flowering plants and be able to take up special orders. The student is expected to be familiar with the modern systems of classification, especially those of Engler and Prantl, and Bentham and Hooker. Courses are also offered in systematic work among the lower plants, the college having an unusually full collection in certain orders especially the economic, like *Uredineae* and *Ustilagineae.* Minor work.

COURSE XXIII.—*Advanced Morphology.*—In this course the comparative anatomy of phanerogams as well as cryptogams is taken up, the student consulting such works as Gray, Engler, Eichler and DeBary. Minor work.

COURSE XXIV.—*Advanced Economic Botany.*—The course in economic botany is offered as a post graduate minor, and the student will take up such topics as the adulteration

of foods, seeds, the germination of plants, the vitality of seeds, in fact any subject especially pertaining to agriculture and horticulture and forestry. Minor work.

COURSE XXV.—*Advanced Mycology.*—The subject of mycology is offered as a minor in post graduate work, the student taking up the study of fungous diseases of cultivated and wild plants. Minor work.

COURSE XXVI.—*Bacteriology.*—Is offered as a minor or major in post graduate work. The student is expected to take up such subjects as sewage pollution of our waters, the examination of potable waters, the diseases of plants, fermentations. This course will not be given unless the prerequisite courses in bacteriology have been taken. Minor or major work.

DEPARTMENT OF ZOOLOGY.

HENRY E. SUMMERS, PROFESSOR.

MR. WALKER, ASSISTANT.

EQUIPMENT.—The laboratory is well supplied with the usual apparatus, including compound and dissecting microscopes, camera-lucidas, microtomes, incubators, paraffin baths, aquaria, etc. In the way of illustrative material, in addition to the general museum and the entomological collections described below, there is a large series of charts, a set of wax embryological models, lantern slides, mounted microscopic slides, disarticulated and articulated skeletons, and alcoholic preparations.

The general museum consists of specimens selected with great care to show the variations of structure found in the various branches, classes and minor divisions of the animal kingdom. Porifera, coelenterata, vermes, echinodermata, arthropoda, mollusca, and vertebrata are all amply represented by actual specimens and Blaschka glass models. It is especially rich, however, in representative birds and mammals. In addition to a good series of skeletons, there are over four hundred mounted skins, and eggs of three hundred species of birds, and over ninety

mounted skins of mammals, the latter including such rare or peculiar forms as the echidna, ornithorhynchus, great kangaroo, kaola, wombat, sloth, great ant-eater, armadillo, manatee, peccary, camel, antelope, bison, Rocky mountain goat and sheep, elk, tapir, porcupine, beaver, fur seal, hedgehog, lemur and monkey.

The collection of insects is very large, embracing about sixty thousand mounted specimens, including a large number of types. There has recently been added to it the Van Duzee collection of Hemiptera, from Buffalo, New York, including the types of the numerous species described by him. There is also a large series of microscopic forms on slides, and a large amount of material illustrating life histories, especially of injurious insects.

The work in zoology is designed, first, to give a knowledge of those biological laws, together with the data necessary for their thorough comprehension, which is today regarded as an essential part of a liberal education; secondly to furnish the requisite theoretical basis for an intelligent study of certain practical branches of stock breeding, dairying, human and veterinary medicine, and economic entomology, which depend directly upon zoological principles; and, thirdly, to impart a knowledge of the facts and methods of investigation in the last of these practical subjects, namely, economic entomology.

COURSE I.—*Introductory Entomology.*—This course is designed as an introduction to all the other work in the Department. Insects are used as convenient forms in giving a training in accurate observation, and in the methods of systematic and field zoology. Some training is also obtained in the use of the microscope. The work begins with a thorough study of the structure of the grasshopper and beetle, followed by the collection of insects and their classification. The life histories of certain selected forms are also traced. The lectures deal chiefly with those facts in the physiology and life history of the different orders of insects that cannot be observed in the laboratory. Incidentally, the general principles involved in dealing with

injurious insects are discussed. One lecture and one laboratory exercise per week. Second term, Freshman year.

COURSE II.—*Vertebrate Zoology.*—A somewhat thorough study of the anatomy, including histology, of the Necturus serves as an introduction to the methods of gross dissection and gives practice in the use of the microscope. A comparison of the frog with the Necturus gives an opportunity to impart a knowledge of homology, and an outline of the development of the same animal lays a foundation for the more extended study of vertebrate embryology in Course V. This is followed by a briefer study of other types, as amphioxus, lamprey, fish, turtle, bird and mammal. Throughout this course the relation of structure to function is kept constantly in view, the end being to give a conception of each animal as a living being. Three lectures and one laboratory exercise per week. First term, Sophomore year. Prerequisite, Zoology I.

COURSE III.—*Invertebrate Zoology.*—A continuation of the preceding course, devoted to the morphology, physiology, and especially the ecology of selected types of the more important groups of invertebrates, including the amoeba, hydra, earthworm, crayfish, and mussel. Especial attention is devoted to the Protozoa, a very full discussion being given in the lectures of the fundamental forms in which animal functions are exhibited in this group. Questions of phylogeny are quite fully discussed, thus laying a foundation for Course VI. Three lectures and one laboratory exercise per week. Second term, Sophomore year. Prerequisite, Zoology II.

COURSE IV.—*Entomology.*—A study of the structure, habits, life histories and classification of insects. Intended as a foundation for independent investigation in this science, especially in applied entomology. Students have access to the entomological library and the rich collections of insects of the Experiment Station, and also the opportunity to follow the entomological investigations in progress here. Two lectures and three laboratory exercises

per week. First term, Junior year. Prerequisite, Zoology, I, II and III.

COURSE V.—*Embryology.*—Th laboratory work is devoted to a study of the development of the frog and of the chick from preparations made largely by the student, supplemented by others furnished for comparison by the instructor. The methods of making reconstructions from serial sections are learned. In the lectures the general principles of development are discussed, bginning with the structure of the germ cells, maturation and fertilization, and tracing the modifications of cleavage and gastrulation found in the different classes of vertebrates. Two lectures and one to three laboratory exercises per week. First term, Junior year. Prerequisite, Zoology, II.

COURSE VI.—*Evolution of Animals.*—A discussion of the problems and factors of organic evolution; heredity, variation, origin and distribution of life, etc. One lecture per week. Second term, Senior year. Prerequisites, Zoology II and III and Geology II.

COURSE VII.—*Comparative Anatomy.*—Advanced work in continuation of Courses II and III. Second term, Junior year. Three lectures and two laboratory periods per week. Prerequisite, Zoology II, III and V.

COURSE VIII.—*Animal Parasites.*—A course of lectures, illustrated by numerous specimens, upon the more injurious parasites of domestic animals. Intended primarily for students of veterinary medicine. Second term, Junior year. Two lectures per week. Prerequisite, Zoology II.

COURSE IX.—*Advanced Entomology.*—Special individual laboratory work in continuation of Course IV, intended for those who expect to pursue entomology as a profession. The exact nature of the work in each case will depend upon the ability and special object of the student. Three to five laboratory exercises per week. First or second term. Junior or Senior year. Prerequisite, Zoology III and IV.

COURSE X.—*Morphology.*—Special individual work in continuation of Courses II, III, V and VII, designed especially for those who expect to become teachers and investigators in zoology and who are writing their thesis in this

department. The work will be given a leaning toward general vertebrate or invertebrate morphology, embryology or taxonomy depending upon the inclination of the student. Three to five hours per week, mainly laboratory. First or second term, Senior year. Prerequisite, Zoology V and VII.

COURSE XI.—*Neurology.*—A course in the comparative morphology of the vertebrate nervous system, with especial attention to the physiological anatomy of the human brain. Two lectures and one to three laboratory exercises per week. First term, Senior year. Prerequisite, Zoology II, III and V.

In addition to the above, special courses will be laid out for students intending to write a thesis in zoology, and also for graduate students in continuation of the lines of work that they pursued as undergraduates. Special facilities will be offered such students for research work.

DEPARTMENT OF GEOLOGY.

SAMUEL WALKER BEYER, PROFESSOR.

The work of this department is carried on by means of recitations, lectures, conferences, laboratory work and numerous field excursions. The student is not only afforded an opportunity to gain some familiarity with the principles and theories discussed in the leading text-books, but is encouraged to test the theories and verify the principles discussed in the class-room. Field excursions, with carefully written reports thereon are required in all of the courses in geology.

EQUIPMENT.

The department is housed in Morrill Hall, sharing with the Department of Zoology the north half of the building. Two rooms on the second floor are given up exclusively to the collections in geology, while the "Iowa Room" serves as a store room and overflow museum room for the departments of Zoology and Geology and Mining. It is also used

as a laboratory for the latter department. The office is located on the first floor and aside from the usual office fixtures affords space for a large map-case and for the smaller pieces of apparatus. A large, well lighted recitation room with a seating capacity of seventy-five is also located on this floor. The room is fitted with auxiliary blinds, arc light connections and all of the appliances for steriopticon purposes, and is used jointly by the two departments housed in the building.

The museum contains carefully selected series of fossils, minerals, rocks and ores; all available for study purposes. Among the more important collections in geology and mineralogy are: The educational series of rocks, collected by the U. S. Geological Survey; the Smithsonian collection of rocks and minerals; the Rohn collection of rocks and ores from the Lake Superior region; the English mineral collection, containing 200 specimens and about 150 species; the Baltimore series of more than 200 specimens of rocks and minerals typical of the petrographic province of Baltimore; the Cushing collection from Clinton County, New York; and a considerable amount of material to illustrate the physical features of rocks and minerals.

In paleontology, the Calvin collection of paleozoic fossils; a large collection of Coastal Plain fossils, principally from the Cretaceous of New Jersey, the Eocene of Alabama and Maryland, and the Miocene of Maryland and Virginia; the Permo-Carboniferous series from Kansas and Russia; and the coal plants of Iowa, Illinois and Pennsylvania are the most important.

In applied geology the department possesses comprehensive series of lead and zinc ores with their characteristic gangue minerals from Joplin, Missouri, and from the Iowa-Wisconsin area; copper and iron from the Lake Superior region and from the celebrated localities in the Ural Mountains; copper, manganese and silver from Butte, Montana; lead and silver from Colorado; and silver and gold from Colorado, Nevada and California.

Aside from the collections enumerated, Dr. H. Foster Bain, of the Iowa Geological Survey, has kindly loaned to

the department his extensive private collections of rocks and minerals; and the Legrand Quarry company generously donated a splendid series of building blocks from their quarries which exhibit the various styles of stone dressing.

The laboratory is supplied with one Bausch and Lomb petrographical microscope; one Fuess, medium model, latest pattern petrographical microscope; both instruments are well supplied with accessories; one Ward mineral dresser; one hand goniometer; one set Preston's celluloid crystal models; one set Krantz wood models; the Krantz collection of 120 thin sections of the common rock-forming minerals selected and arranged according to Rosenbusch; one section slicing machine, and complete apparatus for rock separations by heavy solutions; and is supplied with apparatus for doing all kinds of photographic work. A considerable number of instruments for reconnoissance and field work in geology are owned by the department.

The lecture room equipment comprises a Hitchcock's geological map of the United States; one set of Kiepert's physical maps; numerous maps and charts of the United States Geological Survey and of the Mississippi River Commission and an elaborate series of lantern slides and photographs.

COURSES IN GEOLOGY AND MINERALOGY.

Eight courses are offered in geology and mineralogy, Physiography is required in the Divisions of Science and Agriculture; Courses II, IV to VII, inclusive, are required of students in Mining Engineering; Course III is elective to students in Civil Engineering; Course IX is specially adapted for the short course in Mining Engineering, while Courses II to VIII, inclusive, are elective to all students in the divisions of Agriculture and Science.

COURSE I.—*Physiography.*—First term, Freshman, three hours per week; serves as an introduction to the science of geology. The first half of the term is devoted to the study of the agents which have to do with modifying the earth's crust, while the resultant earth features receive

careful consideration during the second half of the term. Davis' or Tarr's Elements of Physical Geography is the text-book used. Required in the Divisions of Science and Agriculture.

COURSE II.—*General Geology.*—Five hours per week first half year. This course embraces a discussion of the principles which form the ground work of the science. The first ten weeks are devoted to dynamic and structural geology and the last six to stratigraphic and historical geology. The student is required to make several excursions to points of geological interest to verify the more salient facts discussed in the class room.

Prerequisites.—The elementary courses in physics, chemistry and zoology. Required of students in Mining Engineering; elective in the divisions of Agriculture and Science.

COURSE III.—The same as Course II for the first half term, but only three hours per week during the last half of the term. The second half is devoted to a study of the properties, mode of occurrence, origin and distribution of the more important structural materials. Elective to students in Civil Engineering.

COURSE IV.—*Advanced Geology.*—Five hours per week, second term, Senior year. The nature, mode of occurrence and origin of the minerals and rocks which constitute the earth's crust are considered in some detail during the first half of the term, while rock alteration as involved in metamorphism and weathering receives special attention during the second half. Excursions are continued as in II, and students are encouraged to familiarize themselves with the methods employed in doing research work and to make independent observations.

Prerequisites.—Course II. Open to students in the divisions of Agriculture and Science.

COURSE V.—*Economic Geology.*—Three hours per week, second term, Senior year. This course embraces a discussion of the general features and formation of ore bodies, followed by a description of the distribution and the occur-

rence of coal and the more important hydro-carbons, building stones, potable waters, salines and other products of economic importance.

Prerequisites.—Courses II, VI and VII. Required of students in Mining Engineering.

COURSE VI.—*Mineralogy.*—Three hours class room and one hour laboratory, second half Junior year. This course is intended to give the student a clear idea of the morphological and physical properties of crystalline substances.

Prerequisites.—Elementary courses in physics, chemistry and mathematics. Required in the Mining Engineering course and optional in the Division of Science.

COURSE VII.—*Descriptive and Determinative Mineralogy.* —Three hours class room and one hour laboratory in the first term, Senior year. This term's work is devoted to the study of the more important mineral species, their properties, uses, distribution and methods of determination. Required in the Mining Engineering course and elective in the Division of Science.

COURSE VIII.—*Petrography.*—Two hours per week during the second term, Senior year, and is essentially a laboratory course. It embraces a short course in the microscopic study of rocks.

Prerequisites.—Courses VI and VII. Required of students in the Mining Engineering course.

COURSE IX.—*The Geology of Coal.*—Five hours a week for ten weeks in the review course in Mining Engineering. The origin, distribution and mode of accumulation of coal are considered.

DEPARTMENT OF ECONOMIC SCIENCE.

EDGAR WILLIAM STANTON, PROFESSOR.

COURSE I.—*Elements of Political Economy.*—This course is taught by text-book, familiar lectures and class discussions. The student is made acquainted with the laws of production, the theory of value, the principles of domestic and foreign exchange, money and its value ,and the various

theories of distribution and consumption. Topics involving the application of economic principles are studied; for example, industrial cooperation, political money, nationalization of land, bimetallism, taxation, and protection versus free trade. Five hours per week. First term.

COURSE II.—*History of Political Economy.*—This course is an elective in the Courses in Science. Political Economy is here viewed from the historical standpoint. The development of economic fact and theory is traced through t he ancient, mediæval and modern world. The successive economic schools are taken up; their doctrines are considered in connection with the existing industrial conditions; their gradual modification and displacement by other systems is noted; and thus, through the study of the growth of economic thought, the student is led to a clear understanding and better judgment of the economic theories and practical industrial problems of the present time. The History of Political Economy, by Ingram, is used as a text-book.

A special feature of the work is the presentation of topics assigned individual members of the class. The following are some of the reference books used: Emerton, "Introduction to the Middle Ages," "Mediæval Europe;" Adams, "Civilization During the Middle Ages;" Wilson, "The State;" Ingram, "History of Slavery;" Gibbons, "History of Commerce in Europe;" Ashley, "Economic History;" Cunningham, "Outlines of English Industrial History;" Rogers, "Work and Wages," "Economic Interpretation of History;" Wright, "Industrial Evolution of the United States," "Economic Classics." Five hours per week. Second term.

COURSE III.—*Modern Social Problems with a Special Study of Socialism.*—Given as an elective three times per week in the first term, Senior year; Course in Science and Course in Philosophy.

The course opens with an outline study of the industrial revolution and the recent development of economic theory. Socialism and closely allied economic questions

are then considered; the text-book used in this part of the work being Ely's "Socialism, and Social Reform."

The reference books are: "History of Socialism," Kirkup; "Contemporary Socialism," Rae; "Socialism of To-Day," Laveleye; "Quintescence of Socialism," Schaffle. Three hours per week. First term.

DEPARTMENT OF DOMESTIC ECONOMY.

MARY A. SABIN, PROFESSOR.

MISS ELLIS AND MISS HESS, ASSISTANTS.

The wide-spread interest manifested in Domestic Economy springs in no small measure from the increasing attention accorded to all social problems. The importance of the home as a social factor is paramount; and the application of science and of the scientific method to household management is now regarded as an absolute necessity. It is not surprising therefore that the study of the home, its function, its administration, its sanitary conditions, the preparation of foods, and a score of kindred topics should find place in the courses of instruction in colleges and universities. The study of Domestic Economy is valuable not only as being of deep interest and practical worth to the individual, but, as a form of manual training, it is eminently educative, aiding the development of the mind by operations actually performed with the hands. Many sciences find direct application in the operations of housekeeping; it is consequently the aim of this Department to present this home-study in such a way as to apply the knowledge gained in relaed and associated sciences. This study seeks at every point the health, convenience and comfort of the members of the household, and by its utility to add to the value of the well kept home.

Domestic Economy Hall adjoins Margaret Hall and includes beside the general office, the sewing-room, fitting-room, bed-room, kitchen, dining-room, and store-rooms, all

conveniently furnished and equipped for recitations and for demonstrations and practice work.

The methods of instruction embrace the lecture system, text book study, laboratory practice, demonstration lessons, class discussions, presentation of topics on assigned subjects by individual members of the class, and expeditions for observation and criticism. By a judicious combining of theory and practice, science and art, the student gains a thorough understanding of the underlying principles of Domestic Economy and at the same time acquires skill and deftness in execution. Upon completing a systematic course in this Department a young woman is prepared to conduct her home successfully and with that ease which comes only through knowledge and experience.

The work offered in Domestic Economy does not constitute a special and separate course of study, but is one of the several lines included in the general college course for all women students and subject to the usual regulations concerning entrance requirements, classification, examinations, and class records.

Materials, tools and utensils for laboratory work are furnished by the Department and for the use of these, students in the Sewing classes pay a fee of one dollar each term; those in Cooking, two and one-half dollars the first term and three dollars each succeeding term.

Four hours each week are devoted to recitation and practice in each of the several subjects included in Domestic Economy, one of which subjects is offered each term of the four years.

COURSE I.—*Plain Sewing.*—This term's work gives the students a practical knowledge of all varieties of stitches in hand sewing. Each pupil makes a book of models comprising the various stitches, seams, hems, fastenings, plackets, gussets, also patching, darning, lace and embroidery matching, and glove mending. In connection with the sewing, lectures are given upon the making and use of each model, and upon the fabric and the process of its

manufacture. Freshman year. Fall term. Four hours. Miss Hess.

Course II.—*Cooking and Hygiene.*—The classes in the second term's work in Domestic Economy devote three hours each week to practice in the laboratory kitchen, and one hour to lecture work. The various food stuffs are taken up in the order of their simplicity of preparation. As each food is reached in turn, a study is made of its source, cost, chemical composition, digestibility and function in the body, in connection with its most wholesome and scientific method of cooking. The pupil prepares many nourishing and appetizing dishes and is trained at the same time in the points of accuracy, order and economy and in the general care of the kitchen and its utensils.

One hour each week is given to Hygiene. The aim is to instruct the pupil in the general principles of wholesome living. Questions concerning the health of the individual are considered, among others, the care of the lungs, skin, eyes and digestion, the value of exercise in the development of the body, and favorable conditions for physical and intellectual effort. Freshman year. Spring term. Four hours. Miss Sabin and Miss Ellis.

Course III.—*Cooking and Home Sanitation.*—The special feature of this course is the combining and serving of foods. In connection with cooking, instruction and practice are given in the care of the dining room and its furnishings, in table-setting, in serving and in entertaining. From time to time breakfasts, luncheons and dinners are planned, prepared and served by the pupils, familiarizing them with the knowledge essential to the success of the hostess.

One hour each week is devoted to Home Sanitation. The lectures treat of the site, and construction of the house; its plumbing, heating, lighting, ventilation and cleaning. Sophomore year. Fall term. Four hours. Miss Sabin and Miss Ellis.

Course IV.—*Garment Work.*—The second term's work in sewing is open to young women who have completed

the course in Plain Sewing. Garment work is taken up in this course. Each student selects her materials for a suit of underwear and plans, cuts, fits and finishes the suit for herself under the supervision of the instructor. Sophomore year. Spring term. Four hours. Miss Hess.

COURSE V.—*Dressmaking.*—This course is arranged to give a knowledge of the principles of dress-making, with as much practice in their application as time permits. Each young woman purchases, designs and makes one unlined cotton dress and one of woolen material with lining. Junior year. Fall term. Four hours. Miss Hess.

COURSE VI.—*Cooking and Food Materials.*—In the Junior year opportunity is given for added practice in cooking. The foods which are taken up in this term's work require more elaborate preparation than is allowed in the time of the earlier courses, and include roasts, bread and rolls, sauces, salads, desserts and frozen foods. The specific foods prepared are determined by the need and desire of the students.

One hour a week is given to a study of food materials, which are considered in greater detail than is possible in the preceding terms. A study is made of Milk, Butter and Cheese, Eggs, Meat, Fish, Vegetables, Bread, Fruit, Food Accessories and Beverages. Junior year. Spring term.

COURSE VII.—*Cooking and Household Economics.*—In this term's work in Domestic Economy foods are considered chiefly in their hygienic and economic aspects. Some time is given to invalid cookery and in connection with this, home nursing and first aid to the injured are taken up, enabling the young women to become intelligent nurses in their own homes. During the term each student is required to give a demonstration lecture in cooking before the class. She is allowed to choose a class-mate to assist her in the details of the work.

The lectures in this course deal with the following subjects: the organization of the household, expenditures, a study of family budgets, domestic service, marketing,

pecuniary economy of foods, and dietaries. Senior year. Fall term. Four hours. Miss Sabin.

During the first term of the Senior year, provision is made in the Dairy course for young women who desire instruction in Home Dairying; and at the same time the Department of Chemistry offers a series of lectures in Domestic Chemistry.

COURSE VIII.—*Drafting of Patterns.*—The Senior year offers opportunity for those desiring it, to continue the work in sewing. In this course a study is made of drafting of patterns, and as time permits added instruction is furnished in designing and dress-making. Senior year. Spring term. Four hours. Miss Hess.

COURSE IX.—Opportunities for advanced work in Domestic Economy are offered to graduates of the College who have completed the work as outlined above, also to graduates from other institutions of equal rank. For those planning to teach or to take charge of food preparations in institutions a two years post-graduate course is arranged. Research work in home sanitation, physiology and chemistry of foods, practical dietetics, cooking, and other household arts is carried on in connection with work in the Departments of Chemistry, Botany, and other sciences. Miss Sabin.

DEPARTMENT OF PSYCHOLOGY AND ETHICS.

ORANGE H. CESSNA, PROFESSOR.

COURSE I.—*Psychology.*—An optional course of elements and outlines of Psychology is afforded the first term of the Senior year to the students of all the College courses. A standard text is used and supplemented by lectures and laboratory work.

COURSE II.—*Ethics.*—An optional course in Ethics is afforded the second term of the Senior year to the students of all the College courses. Several standard text-books of ethics are employed and supplemented by library work and lectures. All callings and

pursuits of life are based upon some element of moral obligation. It is the purpose of this instruction in ethics to give the student a comprehensive acquaintance with the principles and the duties of a faithful life and good citizenship.

DEPARTMENT OF LITERATURE AND RHETORIC.

ALVIN B. NOBLE, PROFESSOR.

MISS LARRABEE, MISS MACLEAN, MISS SIMONSON AND MISS REED, ASSISTANTS.

In the courses in English two ends are sought, utility and culture. Utility predominates in the first years and culture in the last, though there is hardly a recitation but contains something of both.

So long as man communicates his thoughts and feelings to his fellows, so long will language have a practical value. The man who speaks in a bungling manner, only half succeeds in communicating his thoughts to others. If they catch his real meaning they do it by a happy inference of their own as to what he meant to say. But no man can afford—certainly no college man can afford—to depend on others to correct his own faulty speech. If he uses a wrong word, arranges the parts of the sentence improperly, gives some part an undue emphasis, or fails to indicate clearly the bearing of one sentence upon another, his language does not truly present his thought, and the world may profit little from his attempt to state it. The more valuable his thought, the greater his need for a clear and effective use of language.

If the student has mastered grammar and rhetoric, that is, if he has been trained to *apply* the principles gone over, his speech should be free from errors and inaccuracies of expression. More than this: if he has been directed to the study of good models, if he has been taught not merely to correct what is faulty, but also—and this is far more important—to appreciate what is excellent in diction, in sentence structure, in the development of para-

graphs and of whole compositions—if he has been made to feel the increased utility, the beauty, and the power of language as used by the masters of expression, he will not be content to use language that has only the negative merit of being without faults, but will press on to attain a style enriched by the presence of real excellence, a positive quality. Such language is not simply clear and accurate, it is pleasing and powerful; and the man who has acquired such skill in the use of language has greatly increased his influence in the world. If he can give his valuable thought an adequate expression, his fellows will learn the thought from him, and give him honor accordingly; if he cannot, they will learn it from one who can state it more clearly or more attractively, and the reward is quite as likely to go to the man who best states the thought as to the one who first discovers it.

The courses in grammar, rhetoric, and composition are devoted primarily to this utilitarian end. The facts and principles of language are studied, not as valuable in themselves, but as useful when applied in spoken or written discourse. To this end the student is required to write much, always with some definite object to be accomplished, and usually with some good model before him to inspire him to more earnest effort. When once he has learned to draw from his reading suggestions that will be helpful in his future compositions, he has found a possible utility in everything he studies as literature and has opened the door to continual improvement. Moreover, in learning to appreciate what is best in the models set before him, he gains insensibly something of culture as well as of utility.

The course in debating is designed as a training toward the effective discussion of live topics. Wherever he goes the college graduate is expected to have opinions of his own on the topics of the day, to be able to state them clearly and forcibly, and, if need be, to defend them. To this end he should train himself to close analysis of complex problems, to a severe testing of every conclusion, his own as well as other people's. Moreover, the public

will not wait for him to retire to his study for labored preparation. They expect him to be ready when the occasion calls, and they have generous rewards for the man who is ready—ready to map out a clear-cut line of argument, ready to support it with proofs, and able to present it clearly and forcibly in off-hand discussion. Such readiness comes only from long-continued right-thinking and clear-speaking. It is the aim of this course to start the student toward this goal.

In the courses in literature it is probably true that the culture side predominates, yet utility is seldom lacking. The study of literature calls for close observation, correct inference, fine discrimination. When the mind is trained to do such work, it acquires a power that abides, a power that can be applied to any task. Literature deals with the whole range of human experience, emotion, activity. In studying literature, therefore, we are required to give some study to the mind and heart of man. If such study does not exert an elevating influence, it can only be because the reader does not choose the best, or does not approach the work in the right spirit. At the very least, it ought to give him a deeper insight into human nature, and that is no small gain. But literature is also an art, an art that engages the attention of more people, and holds that attention for a longer time, than does any other art. In studying it, therefore, we are studying one form of art, and in so doing are cultivating the æsthetic sense, a part of our nature not appealed to by most studies. Best of all, perhaps, it brings us into the company of the rarest minds of all times; it gives command of the best thought of the best minds; it brings to us the "blessed companionship of wise thoughts and right feelings." It broadens the mind, quickens the imagination, enlarges the sympathies, enriches the whole nature.

COURSES IN ENGLISH.

ACADEMIC YEAR.

Course I.—*Grammar.*—Syntax of good modern prose; copious analysis, with emphasis on phrases and clauses as

structural units of the sentence, and careful study as to their proper position and connection; daily drill in sentence construction, the application of what the student has learned from sentence analysis; study of the principles of punctuation, with drill in applying them; correction of errors in grammar. Study of language direct, with as little use of text-book as circumstances will permit. Designed to give that ready command of the sentence that shall leave the student free to seek excellence of structure without needing to give conscious thought to correctness. For admission to this course students must pass an examination on the eight parts of speech, their subdivisions, inflections, and properties, or else present a teacher's certificate or a satisfactory grade in a good high school. All courses. Belongs properly to the fall term, but is given in the spring term also. Five hours.

COURSE I a.—*Grammar Review.*—A review course in English I, designed for students who show, by examination or by making elementary mistakes in essays written for English II or English III, that they need further drill in grammar. Students assigned to English I may be promoted to this course, provided their work for the first two weeks is sufficiently good. All courses. Both terms. Two hours.

COURSE II.—*Elementary Rhetoric and Composition.*—Devoted largely to the study of the paragraph, with Scott and Denney's "Composition-Rhetoric" as text-book. Careful analysis of good models, followed by compositions designed to apply the methods just analyzed. An essay once a week, with exercises almost daily; each student to correct the mistakes he has made. Prerequisite, English I taken in class or by examination, or diploma from a partly accredited high school (see page 39). If a student's essays show need of further drill in grammar or punctuation, he will be required to make up the deficiency. Credited in the Agricultural Course as a Freshman study, but in all other courses as Academic. Belongs properly in the spring term, but is given in the fall term also. Five hours.

FRESHMAN YEAR.

COURSE III.—*Advanced Rhetoric and Composition.*—Devoted mainly to the planning of essays and the principles involved in the different forms of discourse. An essay once a week, with frequent exercises in diction and in making plans and outlines. Analysis of good prose models. Prerequisite, English II, taken in class or by examination, or diploma from a fully accredited high school (see page 41). If a student's essays show imperfect preparation, he will be required to make up the deficiency. Required in all the four-year courses. Given in both terms; belongs properly to the fall term in the Science and Engineering courses, to the spring term in the Agricultural course. Five hours.

COURSE IV.—*Composition.*—Weekly themes in narration and description, based on models read and discussed before the class. Prerequisite, English III. Elective in the Agricultural course; required in all the other four-year courses. Spring term only. One hour.

SOPHOMORE YEAR.

COURSE V.—*Composition.*—Weekly themes in exposition. Prerequisite, the preceding courses in English. Required in all the four-year courses. Fall term only. One hour.

COURSE VI.—*Composition.*—Weekly themes and briefs in argumentation. Prerequisite, the preceding courses in English. Elective in the Agricultural course; required in all other four-year courses. Spring term only. One hour.

The aim of the courses in composition is to train the student to express his thought on whatever subject, not only with clearness and ease but with some measure of grace, attractiveness, and power.

JUNIOR YEAR.

COURSES VII AND VIII.—*Debating.*—A course in stating and defining questions for debate, in making briefs, and in

extemporaneous debating; the application of argumentative principles and methods to live topics. Elective in all courses for students who have completed the preceding courses in English. Course VII in the fall term, Course VIII in the spring term. One hour each.

COURSES IN LITERATURE.

JUNIOR YEAR.

COURSE I.—*The Drama.*—Devoted mainly to a study of Shakespeare, with a rapid survey, largely by reports and informal lectures, of the drama before his time, and a rapid reading of one or two dramas of subsequent time. In Shakespeare one or two plays will be studied carefully and one or two others read rapidly. Character analysis and interpretation, with grouping and contrast. Plot analysis, with stages of complication and resolution. Prerequisites, the courses in English for the Freshman and Sophomore years. Elective in the Agricultural course and the two Science courses. Fall term. Three hours.

COURSE II.—*Epic and Lyric Poetry.*—A course in English poetry, excluding the drama. Selections from Milton, Pope, Coleridge, Wordsworth, Shelley, Keats, Tennyson, and Browning. Classification of the various forms of poetry. Study of rhythm, meter, rhyme, alliteration, figures of speech, melody, harmony, etc. Principles of criticism applicable to the poems studied. Prerequisites, the courses in English for the Freshman and Sophomore years, and History II; Literature I, though not strictly necessary, will yet be of great help. Elective as before. Spring term. Five hours.

SENIOR YEAR.

COURSE III.—*Fiction.*—A course in the novel, the romance, and the short story, from the time of Scott to the present day. Plot and character analysis. Disputed points regarding the novel. Outline for systematic study.

Comparison with the drama. Prerequisites, Literature I and the courses in English. Elective as before. Fall term. Three hours.

COURSE IV.—*American Literature.*—A study of our best poets and essayists. Comparison with English authors and works. Interrelations of our literature and history. The prominent writers of the present day. Prerequisites, Literature II and the courses in English. Elective as before. Spring term. Three hours.

DEPARTMENT OF ELOCUTION AND ORATORY.

ADRIAN M. NEWENS, PROFESSOR.

The scheme of work laid out in the courses of this department is not calculated to make professional elocutionists. We suppose that there are special schools with special equipments for that purpose. The work planned is of a more general nature, getting at the subject of speech from the practical and applicatory side rather than from the technical and professional side. With enough theory to inspire confidence, we aim to give each student such work as will be best suited to *him.*

Upon the supposition that each person has an elocution of his *own,* the department work, outlined in the courses below, aims to develop that which each student possesses. Sometimes the best powers of the student are covered with minor faults in speech; poor emphasis, mumbling, drawling, embarrassment, etc.; we endeavor to give him such work as will tend to help him to his best self and away from these difficulties. The work is based on speech, not on gesture or aesthetics. That which will best develop the talking powers, the conversational, the oratorical, the speaking powers of the student is applied as best the time will allow. The gift to speak is a freely distributed gift, more freely given to the human race, possibly, than any other, and it should be cultivated in school and college; we seek, in class-room work, in private instruction on

recitation and required orations, to help the student to stand and think and talk well.

The class-room instruction is partly text book work and partly practical reading and speaking. In the first year we begin with theory and soon come to practice and application. The text book work is the theory and practice of reading and speaking. The theory is never separated from the practice. What the masters of thought have written and spoken form the basis of both theory and practice; these thoughts, their works as they are preserved to us in literature, are to be analyzed and mastered; they are both read and spoken by the student.

Such work in drills in speech, composed of consonant practice, vowel drills, etc., as may best supplement the mastery of spoken language, is carried on constantly and forms a part of the text-book work.

In the upper years, when the work becomes elective, speech, from the student's individual standpoint, is taken up. Orations of the student's own composition are required; recitations are committed and delivered, giving the student opportunity to master thoughts, himself, his class—his audience—at one and the same time. A course in etxempore speech gives a splendid drill in the practical application of the elementary principles.

In the Course for Women, in the Sophomore year, is a course in Aesthetic Culture. This work consists in a series of lectures on the different phases of Aesthetics, physical drills, looking toward the best development of the body, for both health and expression.

ORATIONS.

One strong element in some of the courses is the required work in oration writing and delivery. The oration, a connected address on a stirring topic, carefully written and criticised, carefully drilled and rehearsed, gives a practice in thought and bodily control not to be found in any other line of work. (The drill is based on class-room

work in elocution). The independence in writing and platform manners thus gained can not but prove immensely valuable to the student in after life, should he be a teacher, a scientific lecturer, or a man of authority in any line of work.

In the first term of the Junior Year, a course in the study of oratorical literature has been inaugurated. The oratory that has made history is studied, the subject matter and the structure of the great orations are carefully analyzed, and then upon some topic agreed upon by teacher and student, an oration is required of each member of the class and is delivered in their presence, or before some literary society, or other body of people. In the Senior Year, an oration is also required. (For courses where this work is required and where it is optional, see Courses VIII and IX below.)

We hope to send out men and women from the institution equipped to tell that which they know in a pleasing, forceful and enticing manner. Every one is sure to be called upon to tell what he knows at some time or other, and the first steps and efforts in this direction, we believe, should be attempted before the college work is finished. The above outlines seem to be a fair statement of what is done in this department, and represent the course of study in Elocution and Oratory believed to be practical in any institution of learning.

PRIVATE WORK.

A limited number of students of the college may be taken for private work in Voice Culture, Physical Culture, Reading, and Literary Interpretation. A limited number of students of the college may be taken for *special* coaching and drill on special selections and recitations and orations preparatory to contests, commencements and special programs.

This work is under fixed tuition, which prices may be obtained by addressing the president of the college or the head of the department.

COURSES IN ELOCUTION AND ORATORY.

COURSE I.—(Required) First Term Academic, two hours per week. All courses except Veterinary.

Text-book work and lectures on Purpose, Emphasis and kindred subjects in connection with the practical work in reading. (Very little committing is required of the student. The lessons are concentrated upon select readings.)

COURSE II.—(Required) Open to students who have completed Course I. Freshman, Second Term, one hour per week. All courses except Engineers and Veterinary. Analysis of masterpieces for reading aloud. Thought getting and giving. Lectures on supplementary topics, vocal and physical expression.

COURSE III.—(Elective) Open to students who have passed Course I. Juniors and Seniors preferable. Junior year. First Term, two hours. Courses in Science and Agriculture.

Lectures on practical work in Literary Interpretation, Imagination and its work. Papers on assigned topics required and read in class. Practical platform work.

COURSE IV.—(Elective) Continuation of Course III. Juniors and Seniors prefered. Junior year, Second Term, two hours. Courses in Agriculture and Science.

Lectures on platform work and the delivery of literary and oratorical productions, with some practical work.

COURSE V.—Open to Seniors who have completed Course IV. Senior year, first term, two hours. Courses in Agriculture and Science.

Lectures on Oratory, Orations and Orators. Platform work and the delivery of the required oration with criticisms and drills. (Students have the privilege of one hour drill previous to the delivery of the oration in class.)

COURSE VI.—Open to Seniors only. Senior year, second term, one hour. Courses in Agriculture and Science.

Lectures on Extemporaneous Speech, Toasts, Forensics, etc. Work in class on these lines with debates, etc.

COURSE VII.—Course for women. Sophomore year, second term, two hours.

Lectures on Aesthetic Culture and Expression, with drill and practical work in class.

COURSE VIII.—Public speaking. Required, second term, Junior year. Courses in Science and Agriculture.

Study of the speeches and orations of the masters of oratory. Text-book work. Outlines of speeches and orations. One address required of each student.

COURSE IX.—Orations. Required in second term, Junior, and first term, Senior. Courses in Science. Elective in course in Agriculture.

Oration written under direction of the head of department and drilled by him.

LATIN.

CHARLES E. WOODRUFF, INSTRUCTOR.

The Courses in Latin have in mind, first, the usefulness of language study for mental culture and drill, and, second, the incidental value that a knowledge of Latin has for the grammar and vocabulary of the English language. It is thought that Latin, being wholly analytic and subjective in character, and having played so large a part in the history of the English language, is indispensable in a distinctively technological school for a full rounded preparation of the scientific student.

In the Courses in Science, Latin is an elective during the Academic, Freshman and Sophomore years, and requires five terms' work for full credit. It may be chosen for one more term in the course in General Science for Women. In the Agricultural course, Latin is optional for Freshman, Junior and Senior years.

In Courses I and II Collar & Daniell's First Latin Book is completed and some easy passages read.

In Courses III and IV parts of Caesar are read, together with selections from Nepos and the poets.

In Course V, Cicero's Orations, and in Course VI, the first three books of Virgil are read.

DEPARTMENT OF MODERN LANGUAGES.

LIZZIE MAY ALLIS, PROFESSOR.

MISS MILES, ASSISTANT.

The college now offers a two and one-half years' course in German and two years' course in French.

Students elect French or German in the Freshman year of all the Engineering courses.

In the Academic year of the course in Science, German is optional with Latin, provided the English grammar of the Academic year has been completed.

In the Freshman year of the course in Science, second year German, and first year French are optional with second year Latin.

In the Sophomore year of the same course, for the first term, third year German and second year French are optional with third year Latin.

In the course for Women, in the Academic year, German is optional with Latin, if English grammar of the Academic year has been completed.

German and French are optional with Latin in the first two years of the Course for Women.

German and French are electives in the Junior and Senior years of the same course.

FRENCH.

COURSE I.—*First Term.*—Chardenal's "Complete French Course," is used as text-book for the grammatical work, supplemented by conversation and dictation exercises.

COURSE II.—*Second Term.*—Translation and study of "Contes de Fees" Joynes; "L'Abbé Constantin," Halévy

COURSE III.—*Third Term.*—"Colomba," Merimée; "Un Philosophe Sous Les Toits," Souvestre.

COURSE IV.—*Fourth Term.*—"Histoire d'une Bouchee de Pan," Mace; "Lecture et Conversation," Fontaine.

GERMAN.

COURSE V.—*First Term.*—Spanhoofd's "Lehrbuch der Deutschen Sprache," including grammar composition, reading and conversation.

COURSE VI.—*Second Term.*—"Lehrbuch der Deutschen Sprache" with continued drill in the principles of declension, conjugation and syntax .Storm's "Immensee."

COURSE VII.—*Third Term.*—"Höher als die Kirche Hillern; "Fritz auf Ferien," Hans Arnold.

COURSES VIII, and IX.—*Fourth and Fifth Terms.*—"German Science Reader," Gore; Works of Goethe and Schiller, conversation and study of syntax being continued throughout the course.

DEPARTMENT OF HISTORY.

ORANGE H. CESSNA, PROFESSOR.

Increasing emphasis is rightly placed on the value of the study of history both from the standpoint of general culture and of usefulness. The men and women who take up the duties of citizenship in this day should have the broadest outlook and come to their tasks with a sympathetic appreciation of what the world has already achieved. No study can have a more practical bearing upon the preparation of the citizen than the evolution of human institutions.

The present day utilitarian view of life may sacrifice the man and the citizen may be sacrificed in the interest of the specialist, yet in reality he is the most successful in his specialty, other things being equal, who comes to it with the broadest general preparation.

In view of these facts, the courses in history aim to give, as far as possible in the limited time allotted, a good general view of the evolution of social, economical and political institutions and the main elements of civilization in general, and to fit the student for intelligently assuming the duties of citizenship.

The student has at his command the large college library, which contains, besides the principal works of reference, an important section devoted to historical subjects. Quite an addition to the library has been recently made of the new books covering the later phases of historical development.

The text-book in each case is equivalent to about one-half the required work. The remainder is covered by the lectures and library and thesis preparation.

Six courses in history are offered, as follows:

COURSE I.—*General History.*—A general survey of the history of the world. Special attention is given to the unity of historical movement and the consideration of the great forces which have produced the social and political institutions of the modern world.

A text-book is used which is supplemented by lectures and library work. Five hours per week, first term of the Academic year of the Science and Engineering courses and the first term of the Freshman year of the Course in Agriculture.

COURSE II.—*English History.*—A general survey of English history with special reference to the origin and growth of the social and political institutions out of which American civilization grew. The struggles for religious and political liberty are noted with care, together with a general view of the main elements and institutions of Anglo-Saxon civilization.

The text-book is supplemented by lectures and library work. Three hours per week, second term of the Academic year of the Science and Engineering courses and the second term of Freshman year of the Course in Agriculture.

COURSE III.—*Mediaeval History.*—Beginning with a brief review of the main features of Greek and Roman civilization, the course covers a general survey of the Middle Ages from the invasion of the barbarians to close of the fifteenth century. Special attention is given to the new elements introduced by the Germanic peoples and the development of the great institutions of the Mediaeval per-

iod, together with the origin and early growth of the modern states of Europe.

The text is supplemented by lectures and assigned readings with written work. Three hours per week.

Elective in the first term of the Junior year of the courses of Science and Agriculture.

Course I is a prerequisite for entering this course.

COURSE IV.—*Modern History.*—This course aims to familiarize the student with the main facts in the development of the modern states of Europe. There is a careful study of the revolutionary periods and the progress of Democracy, also an endeavor to understand the essential features of world politics of the present day, and the significance of the movements in the Far East.

The text is largely supplemented by lectures and library work. Three hours per week, elective in the Second term of the Junior year of the Science and the Agriculture courses. Course III a prerequisite for entering this course.

COURSE V.—*The Development of the United States.*—A study of the origin and growth of the social, economic and political institutions of the American nation. The aim is not only to understand the development of the past, but the significance of the present day movements as the United States enters as a factor in the world politics at the beginning of the 20th Century.

Text-book, lectures and extensive library work together with thesis preparation.

Three hours per week. Elective in the first term of the Senior year of the Science and Agriculture courses.

COURSE VI.—*History of Civilization.*—The aim in this course is to give at least an outline of the permanent elements of human progress with some reference to the evolution and philosophy of the great movements in the development of modern civilization.

Text-book, lectures and thesis work.

Three hours per week, elective in the Second term of the Senior year of the Science and Agriculture courses.

DEPARTMENT OF MILITARY SCIENCE AND TACTICS.

JAMES RUSH LINCOLN, PROFESSOR.

It is not intended to complete the education of the thorough soldier, but to fit young men for filling intelligently, positions in the State troops as line officers and company instructors. The constant demand for men thus trained emphasizes the value of a thoroughly organized and well sustained military course. The chief advantages derived are the acquirement of a dignified carriage of the person, a gentlemanly deportment and a self-respecting discipline, with habits of neatness, order and punctuality. Opportunities are afforded each cadet for extending the studies in military science, as desired, the College being provided with the necessary arms, accoutrements and outfits for drill and instructions in the infantry, artillery, and signal tactics, for which special classes will be formed. Lectures on military subjects are delivered throughout the course, and regular battalion drill and parade take place each Monday and Wednesday afternoons. All male students of the College, except such as may be excused on account of physical disability by proper authority, are required to become members of the College battalion, and wear the prescribed uniform during military exercises. Students in the Academic year are not required to drill.

COURSE I.—First Term, Freshman Year.—Two drills each week.

COURSE II.—Second Term, Freshman Year.—Two drills each week.

COURSE III.—First Term, Sophomore Year.—Two drills each week and Non-Commissioned Officers' School of one hour each week; School of the Guides and Guard Duty.

COURSE IV.—Second Term, Sophomore Year.—Two drills each week, and Non-Commissioned Officers' School of one hour each week; Drill Regulations and Guard Duty.

COURSE V.—First Term, Junior Year, and

COURSE VI.—Second Term, Junior Year.—Two drills each week, and Officers' School of one hour each week;

Drill Regulations, Guard Duty and Army Regulations. Elective in all courses.

COURSE VII.—First Term, Senior Year, and

COURSE VIII.—Second Term, Senior Year.—Two drills each week and Officers' School of one hour each week; Service of Security and Information; Military Engineering; Military Law, and Military Hygiene. Elective in all courses.

THE LIBRARY.

VINA ELETHE CLARK, LIBRARIAN.
MISS STEVENS, ASSISTANT.

The College Library numbers about 14,000 volumes, these being standard works of history, biography, engineering, agriculture, natural science, mental and moral philosophy, poetry, general literature and reference. It has been arranged with a view to making it especially valuable as a reference library.

The books are selected by specialists, the heads of departments indicating such works as they wish the library to have bearing upon their respective lines of study.

The library is classified according to the Dewey system and the card catalog is in two parts, the Dictionary (author and title) and Classed.

The library receives about 200 periodical publications, literary, scientific and general, and there are complete files of many of these upon the shelves.

The library has on file 3,000 unbound pamphlets, and is in constant receipt of large numbers of pamphlet publications from the various departments of the government, agricultural experiment stations and other sources. The library has also several hundred bound volumes of government publications, such as Geological Surveys, United States Experiment Station Bulletins, Congressional Record, War of Rebellion Record, Census Reports, Cabinet Officers' Reports, etc.

The reading room of the library is a large, well-lighted room, and is open to readers ten hours daily, except

Saturdays and Sundays, when it is open four and five hours respectively. Current numbers of periodicals are kept in the reading room and are accessible to all, as are newspapers, College exchanges, dictionaries, encyclopædias Poole's Index, the card catalogue, etc.

The library subscribes for several Chicago, Kansas City and Iowa dailies, and, through the courtesy of the editors, a large number of the daily and county newspapers of Iowa are sent to the reading room for the use of students.

Personal assistance and suggestions upon all matters relating to the library will be given by the librarian and assistant to all who desire such help.

All students in the Freshman Year in all courses are required to take Library work to the extent of four hours per term.

COURSE I.—*Library Work.*—Four hours in the First term, Freshman year, and

COURSE II.—*Library Work.*—Four hours in the Second term, Freshman year. Instruction in the use of the catalogue and reference books.

DEPARTMENT OF MUSIC.

FRANK J. RESLER, DIRECTOR.

The general plan of instruction is similar to that of the best conservatories, and aims to cultivate in the pupil an intelligent appreciation of the noble and beautiful in music. It is designed to lay a sound foundation upon which to build rather than to impart a superficial knowledge for the purpose of display. The branches taught are Piano, Pipe Organ, History of Music, Voice Culture and Sight Singing.

PIANO—COURSE OF INSTRUCTION.

Grade 1.—Rudiments of Music, Touch and Technique, Preparatory Exercises by Kohler, Czerny, Duvernoy, etc.

Grade 2.—Touch and Technique. Exercises by Concone, Loeschorn, Czerny, Heller, etc. Octave studies and easy pieces by good composers.

Grade 3.—Touch and Technique. Sonatas by Haydn and Mozart. Selections from Schubert, Heller, etc.; studies by Plaidy, Czerny, etc.

Grade 4.—Sixty selected studies by Cramer-Buelow, Beethoven's Sonatas. Selected works from Mendelssohn, Weber, Chopin, Rubinstein, Liszt, etc. Daily studies by Tausig.

VOICE CULTURE.

The method of vocal study aims, by graduated exercises and pieces carefully selected, to develop quality of tone, flexibility, power and compass of voice along with correct style and expression in all kinds of songs.

The method aims at ease of production of tones, cultivation of the proper sensation of each tone, correct phrasing, and withal, clean enunciation. Throaty, breathy, palatal and nasal tones are eradicated.

All advanced pupils are admitted free to a large chorus choir, under the leadership of the Director of Music. Only the best works from the great composers are used, and it is believed that the proper rendering of such music is of no little benefit to the musical culture of the earnest student.

The chorus furnishes the music at the Sabbath service and assists in the concerts and public recitals of the department.

Public concerts and recitals are given at frequent intervals during the year; also private recitals weekly, in which all music pupils will be expected to take part.

Students may enter at any time. All tuition and piano rent is payable in advance to the director.

Students may enroll for music alone without additional expense.

EXPENSES.

Tuition for half-hour lessons in each branch:

For term of twenty lessons.....$15.00
For term of thirty lessons..... 21.50
For term of forty lessons..... 28.00

The Department of Music is prepared to furnish practice rooms with piano, light and heat for the following rate: One hour daily for the entire school term, $3.00.

For additional hours the rate per hour will be a little less. All music will be furnished at a discount.

STUDENTS OF THE COLLEGE.

STUDENTS.

SENIOR HONOR STUDENTS, 1900.

Each speaker has the highest standing in the course represented.

Sybil M. Lentner, Course in Science.

Sophia Schott, Course in General and Domestic Science

Charles A. Egger, Course in Electrical Engineering.

Wilber Wilson, Course in Mechanical Engineering.

W. L. Johnson, Course in Veterinary Science.

Charles E. Ellis, Course in Agriculture.

The remaining four speakers are those having the highest average standing of all the candidates for degrees from all the courses, excepting those that represent some particular course:

Stella Ellis, Course in General and Domestic Science.

E. R. Walker, Course in Science.

Birdie C. Kegley, Course in Science.

Della Johnson, Course in General and Domestic Science.

No graduates in Civil Engineering owing to change in college year.

POST-GRADUATES.

NAME.	POSTOFFICE.	COUNTY
Barnes, S. E., B. S. A.,	Brighton,	*Texas.*
Brown, J. C., B. S. A.,	Dexter,	Dallas,
Clark, L. F., B. Ag.,	W. Brattleboro,	*Vermont.*
Eastwood, Maude, B. Ph.,	Ames,	Story.
Ellis, C. E., B. S. A.,	Ames,	Story.
Erwin, A T.,	Ames,	Story.
Faurot, F. W., B. Sc.,	Ames,	Story.
Grettenberg, H. N., B. S. A.,	Mitchell,	Mitchell.
Hess, Alice Ward, B. Sc.,	Olin,	Jones.
Hume, H. Harold, B. Ag.,	Lake City,	*Florida.*
Little, E. E., B. S. A.,	Ames,	Story.
McCusker, C. J., B. Sc.,	Decorah,	Iowa.
Paddock, A. Estella, B. Sc.,	Grundy Center	Grundy.
Palmer, Henry, B. S. A.,	Cedar Falls,	Black Hawk
Rolfs, J. A., B. Sc.,	LeClaire,	Scott.
Vernon, J. J. B. S. A.	Mesilla Park,	*N. Mexico*
Walker, E. R., B. Sc.,	Oelwein,	Fayette.

I. W. Williams, B. Sc.	Manley,	Worth.
Witter, Georgetta, B. L.,	Des Moines,	Polk.
Webster, E. H., B. Ag.,	Meridan,	*Kansas.*

SENIORS.

NAME.	COURSE.	TOWN.	COUNTY.
*Bennett, Linton P.,	Sc.,	Des Moines,	Polk.
Blumer, Jacob,	Ag.,	Luverne,	Kossuth,
*Bone, F. S.,	Sc.,	Hopeville,	Clark.
*Bunker, J. W.,	Ag.,	New Providence,	Hardin.
Carter, Geo. L.,	Sc.,	Rock Valley,	Sioux.
Crane, Merle D.,	Ag.,	Ames,	Story.
*Cumming, Melville,	Ag.,	Truro, N. S.,	*Canada.*
*Day, W. E.,	Vet.,	Utica,	Van Buren.
*Deming, Chas. W.,	Vet.,	Des Moines,	Polk.
Diller, L. L.,	Ag.,	Marshalltown,	Marshall.
*Down, Ella,	G&D. S.,	Odebolt,	Sac.
*Eastwood, Maud,	G&D. S.,	Ames,	Story.
Eckles, Herbert C.,	Ag.,	Marshalltown,	Marshall.
*Egger, Chas. A.,	E. E.,	Buffalo,	Scott.
*Ellis, Chas. E.,	Ag.,	Ames,	Story.
*Ellis, Stella,	G. & D. S.,	Ames,	Story.
*Faurot, F. W.	Sc.,	Ames,	Story.
Fitzwater, W. D.,	Sc.,	So. English,	Keokuk.
Frandson, Herman,	Ag.,	Story City,	Story.
Garver, Herman,	C. E.,	Farmington,	Van Buren.
Gray, C. E.,	Ag.,	Col. Junction,	Louisa.
*Haecker, A. L.,	Ag.,	Lincoln,	*Nebraska.*
Hall, Ernest H.,	Ag.,	Iowa City,	Johnson.
Hancock, Emma,	G&D. S.,	West Union,	Fayette.
*HasBrouck, Hattie,	G&D.S.,	Humeston,	Wayne.
Haw, E. A.,	Sp.,	Ottumwa,	Wapello.
*Henson, Paul,	Sc.,	Denison,	Crawford.
Hopkins, H. S.,	Ag.,	Mt. Pleasant,	Henry.
Horner, James F.,	Ag.,	St. Louis,	*Missouri.*
*Houghton, W. A.,	Ag.,	Norway,	Benton.
Howe, Mrs. R. B.,	G. & D. S.,	Chicago,	*Illinois.*
Hovland, Ole,	E. E.,	Norseland,	*Minnesota.*
Jenkins, A. T.,	E. E.,	Washta,	Cherokee.
Johnson, D. W.,	Ag.,	Agency,	Wapello.
*Johnson, S. P.,	E. E.,	Paton,	Greene.
*Johnson, Della,	G&D. S.,	Perry,	Dallas.
*Johnson, W. L.,	Vet.,	Ontario,	Story.
*Kegley, Birdie C.,	Sc.,	Ames,	Story.
*Kelsey, Susa,	G&D. S.,	Manchester,	Delaware.

Kinzer, R. J.,	Ag.,	Bangor,	Marshall.
*Knight, Addie,	G&. S.,	Holmes,	Wright.
Lamb, W. E.,	E. E.,	Mapleton,	Monona.
Lathrop, Jay C.,	C. E.,	Garner,	Hancock.
*LeClere, E. G.,	Sc.,	Chillicothe,	Texas.
*Lentner, Sybil,	Sc.,	Ottumwa,	Wapello.
*Lewis, Martin,	M. E.,	McKinney,	Texas.
*Lowe, J. H.,	Vet.,	Ames,	Story.
Madson, J.,	Vet.,	Hawkeye,	Fayette.
*Marshall, F. R.,	Ag.,	Ontario,	*Canada.*
*Mast, William H.,	Ag.,	Agency,	Wapello.
Mereness, G. A.,	E. E.,	Glidden,	Carroll.
Miller, F. G.,	Ag.,	Red Oak,	Montgom'y.
Myers, E. C.,	Ag.,	Flandreau,	*So. Dakota.*
*McBirney, J. F.,	E. E.,	Conrad,	Grundy.
*McDill, Wilson,	Ag.,	Creston,	Union.
*McKinley, A. D.,	Sc.,	Clermont,	Fayette.
*Nicholas, Nellie,	G&D. S.,	Montezuma,	Poweshiek.
*Nolan, Brete C.,	E. E.,	Havelock,	Pocahontas.
Obrecht, R. C.,	Ag.,	Harlan,	Shelby.
*Paddock, Estella,	Sc.,	Grundy Center	Grundy.
*Palmer, Henry,	Ag.,	Cedar Falls,	Black Hawk.
*Parker, Foster,	Vet.,	Ames,	Story.
Perrin, Chester,	Sp.,	Mapleton,	Monona.
Peshak, Elmer,	E. E.,	St. Ansgar,	Mitchell.
Pike, Hattie,	G&D. S.,	Olin,	Jones.
Porter, Harry,	Ag.,	Woodbine,	Harrison.
Savre, E. E.,	E. E.,	Northwood,	Worth.
*Scott, Ira J.,	Sc.,	Slater,	Story.
*Schott, Sophia,	G. & D. S.,	What Cheer,	Keokuk.
Sokol, G. F.,	Ag.,	Onslow,	Jones.
Stevens, Olive,	Sp. Sc.,	Boone,	Boone.
Stivers, E. D.,	Sc.,	Mason City,	Cerro Gordo
*Suit, Frisbie T.,	Vet.,	Libertyville,	Jefferson.
Taylor, G. A.,	C. E.,	Newton,	Jasper.
*Thomas, Hall H.,	Sc.,	Decorah,	Winneshiek
Tuttle, E. B.,	Sp.,	Ames,	Story.
*Walker, E. R.,		Oelwein,	Fayette.
*White, Chas. S.,	Sc.,	Audabon.	Audabon.
*Wilson, W. M.,	M. E.,	West Liberty,	Muscatine.
*Wortman, R. W.,	E. E.	Kelly,	Slater.
Van Liew, J. Edgar,	C. E.,	Des Moines,	Polk.

*Graduated December, 1900.

JUNIORS.

NAME.	COURSE.	TOWN.	COUNTY.
Ahlers, Fred H.,	Vet.,	Lamotte,	Jackson.
Askew, G. A.,	Sp. Ag.,	McVeigh,	Van Buren.
Austin, J. C.,	M. E.,	Spirit Lake,	Dickinson.
Baldwin, Arthur T.,	Vet.,	Des Moines,	Polk.
Barber, Florence,	G. & D. S.,	New Hampton	Chickasaw.
Barclay, Josephine,	G. & D. S.,	West Liberty.	Muscatine.
Barger, May,	Sc.,	Ontario,	Story.
Barton, Elva,	G. & D. S.,	Luverne,	Kossuth.
Bennett, Herbert A.,	C. E.,	Milford, New	Hampshire.
Bigelow, Alida,	G. & D. S.,	Ames,	Story.
Bingham, Beulah,	G. & D. S.,	Ames,	Story.
Blanche, G. W.,	Vet.,	Conrad,	Grundy.
Bower, W. C.,	Vet.,	West Union,	Fayette.
Bremner, Roger L.,	C. E.,	Yankton,	*So. Dakota.*
Brown, Franklin,	Ag.,	Boone,	Boone.
Brown, Daisy,	Sp.,	Ames,	Story.
Byl, F. M.,	M. E.,	Cedar Falls,	Blackhawk.
Campbell, Grace,	G. & D. S.,	Newton,	Jasper.
Campbell, Roy,	Vet.,	Des Moines,	Polk.
Chambers, L. M.,	Min. Eng.,	Waverly,	Bremer.
Cleghorn, M. P.,	E. E.,	Onawa,	Monona.
Coye, John S.,	Sc.,	Carson,	Pott'ttamie.
Crocker, Thomas,	E. E.,	Perry,	Dallas.
Donelson, W. C.,	Ag.,	Ogden,	Boone.
Donelson, V. E.,	Ag.,	Ogden,	Boone.
Elliott, C. L.,	Vet.,	Sioux City,	Woodbury.
Elwell, F. N.,	Vet.,	Ames,	Story.
Elwell, Frank D.,	Min. Eng.,	Ames,	Story.
Farmer, H. L.,	Sp S.c.,	Sioux Rapids,	Buena Vista.
Felton, John A.,	E. E.,	Neola,	Pottawattamie.
Flynn, J. P.,	C. E.,	Belle Plaine,	Buena Vista.
Fogg, Maurice A.,	C. E.,	Sioux City,	Woodbury.
Gidley, T. W.,	Vet.,	Strahan,	Mills.
Gould, J. H.,	Vet.,	Fairmount,	Jasper.
Graham, Ralph,	Vet.,	Newton,	Jasper.
Hanger, L. M.,	Ag.,	Paton,	Greene.
Hastings, W. W.,	Ag.,	Osage,	Mitchell.
Hawk, J. O.,	Sp.,	Foster,	Monroe.
Higgins, E. C.,	E. E.,	Burlingame,	*Kansas.*
Huffman, E. W.,	Vet.,	Nora Springs,	Floyd.
Hummel, J. G.,	M. E.,	Newton,	Jasper.
Hunt, W. S.,	Vet.,	Ames,	Story.
Hurst, Wilbur,	Vet.,	Ames,	Story.
Hytland, Thyra,	G. & D. S.	Ames,	Story.
James, Ward R.,	Sc.,	Sigourney,	Keokuk.
Jenks, Frances,	G. & D. S.,	Coon Rapids,	Carroll.

Jenks, Ada,	G. & D. S.,	Coon Rapids,	Carroll.
Kelly, W. F.,	M. E.,	Red Oak,	Montgomery.
Kerr, Elizabeth,	Sp.,	Renwick,	Humboldt.
Kieth, Robert R.,	M. E.,	Des Moines,	Polk.
Lawton, J. H.,	E. E.,	Newell,	Buena Vista
Lee, Ernest E.,	M. E.,	Iola,	*Kansas.*
Lenderink, H. A.,	E. E.,	Orange City,	Sioux.
Ludwig, H. J.,	C. E.,	Ames,	Story.
Lytle, W. H.,	Vet.,	Kelly,	Story.
Martin, Clive G.,	Vet.,	Des Moines,	Polk.
Mason, W. D.,	Ag.,	Pierce,	*Nebraska.*
Merritt, Alice,	G. & D. S.,	Grundy Center	Grundy.
Miller, W. E.,	Vet.,	Des Moines,	Polk.
Miller, May,	Sc.,	Ames,	Story.
Mills, Marcella,	G. & D. S.,	Jefferson,	Greene.
Moore, Lloyd H.,	M. E.,	Ames,	Story.
Morgan, Charles,	Vet.,	Humboldt,	Humboldt.
Muhs, L. R.,	C. E.,	Camanche,	Clinton.
McBirney, J. F.,	C. E.,	Conrad,	Grundy.
McClure, H. B.,	Ag.,	Dallas Center,	Dallas.
McIntire, H. A.,	Vet.,	Ames,	Story.
McKinney, Roy C.,	Sc.,	Cleghorn,	Cherokee.
Nelson, J. C.,	C. E.,	Harlan,	Shelby.
Nichols, T. E.,	E. E.,	Atlantic,	Cass.
Nowlan, E. R.,	E. E.,	Havelock,	Pocahontas.
Oldsen, C. A.,	Sp. Ag.,	Wall Lake,	Sac.
Otto, W. W.,	Sc.,	Castana,	Monona.
Parks, H. M.,	Sp. Min.,	Creston,	Union.
Peck, DeWitt C.,	Ag.,	Deer Lodge,	*Montana.*
Peshak, Roy,	E. E.,	St. Ansgar,	Mitchell.
Poch, Lewis,	Sc.,	Atlantic,	Cass.
Rantschler, Luella,	Sc.,	Pueblo,	*Colorado.*
Read, Norma,	G. & D. S.,	Ames,	Story.
Read, Homer,	E. E.,	Des Moines,	Polk.
Rew, N. C.,	Ag.,	Corydon,	Wayne.
Roberts, H. A.,	Sp. Ag.,	Marathon,	Buena Vist
Scholty, W. E.,	Vet.,	Allerton,	Wayne.
Shealy, A. S.,	Vet.,	Delmar,	*So. Carolina.*
Sies, Raymond,	Sc.,	Red Oak,	Montgomery.
Skinner, H. G.,	Ag.,	Ames,	Story.
Slifer, Clyde,		Grundy Center	Grundy.
Stanton, Margaret,	G. & D. S.	Ames,	Story.
Stevens, S. W.,	Sc.,	St. Louis,	*Missouri.*
Stewart, J. E.,	C. E.,	Packwood,	Jefferson.
Stuhr, Walter,	Vet.,	Ames,	Story.
Trigg, Elsie,	G. & D. S.,	Rockford,	Floyd.
Waggoner, Isom,	Ag.,	Primghar,	O'Brien.
Wagner, Leonard,	C. E.,	Boone,	Boone.
Wall, John C.,	Ag.,	Ankeny,	Polk.

Wallace, Dan,	Ag.,	Des Moines,	Polk.
Warburton, Clyde,	Ag.,	Independence,	Buchanan.
Warden, Alice,	G. & D. S.,	Vancleve,	Marshall.
Washburn, J. R.,	Vet.,	Hillsdale,	*Michigan.*
Weakley, F. M.,	Min. Eng.,	Ames,	Story.
Welsh, Chas. A.,	C. E.,	Boone,	Boone.
Wood, A. L.,	Vet.,	Prairie City,	Jasper.

SOPHOMORES.

NAME.	COURSE.	TOWN.	COUNTY.
Adkins, Harry,	C. E.,	Paulena,	O'Brien.
Allison, Frank E.,	Ag.,	Lohrville,	Calhoun.
Alvord, Raymond,	E. E.,	Marcus,	Cherokee.
Anderson, Isaac,	Sp. E. E.,	Madrid,	Boone.
Andrews, E. V.,	Ag.,	Marshalltown,	Marshall.
Angier, G. H.,	Ag.,	Storm Lake,	Buena Vista.
Barrett, R. S.,	Sp.,	Osage,	Mitchell.
Bartholomew, Anna,	Sp.,	Ames,	Story.
Battey, W. R.,	E. E.,	Dexter,	Dallas.
Beebe, J. W.,	Sp. Min.,	Marshalltown,	Marshall.
Bennett, A. F.,	E. E.,	Wyoming,	Jones.
Benson, Jesse,	Min. Eng.,	Gladbrook,	Tama.
Blair, Robert A.,	C. E.,	Humboldt,	Humboldt.
Bowen, T. J.,	C. E.,	Hudson,	Blackhawk.
Bower, Mae,	G. & D. S.,	West Union,	Fayette.
Bracken, Anna,	Sp.,	What Cheer,	Keokuk.
Bradley, W. L.,	Sp.,	Ames,	Story.
Brauch, John S.,	E. E.,	Gladbrook,	Tama.
Brehl, John,	M. E.,	Marshalltown,	Marshall.
Brock, W. I.,	E. E.,	Council Bluffs,	Pott'ttamie.
Brown, Josephine,	Sc.,	Shelby,	Shelby,
Brown, F. L.,	Sc.,	Shelby.	Shelby.
Brown, John F.,	C. E.,	Shelby,	Shelby.
Bruntlett, E. H.,	C. E.,	Wyoming,	Jones.
Buchanan, C. C.,	E. E.,	Lamoille,	Marshall.
Buck, Leon,	G. & D. S.,	Moulton,	Appanoose.
Buckley, Arthur,	E. E.,	Shelby,	Shelby.
Burton, H. J.,	M. E.,	Colchester,	*Illinois.*
Butler, Clay,	M. E.,	Alton,	*Illinois.*
Butts, D. J.,	E. E.,	Van Wert,	Decatur.
Cairns, Belle,	Sp.,	Ames,	Story.
Carey, J. R.,	Ag.,	Ames,	Story.
Cleghorn, John C.,	Min. Eng.,	Onawa,	Monona.
Coates, A. B.,	E. E.,	Clarinda,	Page.
Cutler, F. G.,	Ag.,	Carthage,	*Illinois.*
Davis, Franc. N.,	Sp. E. E.,	Sioux City,	Woodbury.
Dimmitt, H. G.,	M. E.,	Ottumwa,	Wapello.
Dodd, T. W.,	C. E.,	Gladbrook,	Tama.

Dodge, H. K.,	C. E.,	St. Ansgar,	Mitchell.
Donovan, D. E.,	C. E.,	Waverly,	Bremer.
Dreher, Irving,	M. E.,	Scranton,	Greene.
Dryden, C. P.,	E. E.,	Quick,	Pott'ttamie.
Ebersole, H. N.,	M. E.,	Keokuk,	Lee.
Edwards, Robert H.,	Sp.,	Williamsburg,	Iowa.
Elder, A. E.,	Sc.,	Alerton,	Wayne.
Ehlers, Blanch,	G. & D. S.,	Correctionville	Woodbury.
Ellenbarger, Howard,	Ag.,	Ames,	Story.
Eveland, Porter,	E. E.,	Garden Grove,	Decatur.
Fitch, T. T.,	C. E.,	Lytton,	Sac.
Ford, Harriett,	Sp.,	Ottumwa,	Wapello.
Fort, Karl W.,	M. E.,	Rhodes,	Marshall.
Frost, Geo. A.,	E. E.,	Clear Lake,	Cerro Gordo.
Gardner, S. B.,	C. E.,	Osage,	Mitchell.
Gearhart, Guy,	M. E.,	Jewell,	Hamilton.
Gerst, Harry A.,	C. E.,	Marshalltown,	Marshall.
Gibson, A.,	Sp. Eng.,	Oskaloosa,	Mahaska.
Giddings, Mabel,	Sp.,	Ames,	Story.
Gilchrist, Willard,	Ag.,	Ontario,	Story.
Goos, Julian,	E. E.,	Gladbrook,	Tama.
Goss, Dana,	E. E.,	Windom,	*Minnesota.*
Grant, Nellie S.,	G. & D. S.,	Rolfe,	Pocahontas.
Hanson, Lillian,	G. & D. S.,	Odebolt,	Sac.
Healy, Walter,	E. E.,	Britt,	Hancock.
Hendrix, W. W.,	C. E.,	Letts,	Louisa.
Hobein, Charles A.,	E. E.,	Estherville,	Emmet.
Holbrook, Bruce,	C. E.,	Onawa,	Monona.
Hollen, O. H.,	C. E.,	Middle River,	Madison.
Holmdale, J.,	E. E.,	Boone,	Boone.
Hopkins, Richard H.,	C. E.,	Nevada,	Story.
Houck, E. C.,	E. E.,	Bedford,	Taylor.
Howard, Roy T.,	Ag.,	Ames,	Story.
Hoyman, Charles,	Sp.,	Stanwood,	Cedar.
Hunt, Thomas S.,	Ag.,	Ackley,	Hardin.
Hutchinson, Thomas,	Sp. Ag.,	Anderson,	Fremont.
Hyde, Edward,	Ag.,	Washington,	*D. C.*
Ireland, W. I.,	E. E.,	Rolfe,	Pocahontas.
James, M. O.,	E. E.,	Battle Creek,	Ida.
Johnson, Daisy,	G. & D. S.,	Ames,	Story.
Johnson, Dora,	G. & D. S.,	Ames,	Story.
Johnson, Pearl,	G. & D. S.,	Ontario,	Story.
Jones, Ira W.,	E. E.,	Allison,	Butler.
Jones, John S.,	Ag.,	Manchester,	Delaware.
Kegley, J. W.,	Ag.,	Ames,	Story.
Kempf, Geo. P.,	M. E.,	Victor,	Mitchell.
Kester, Newton,	M. E.,	Allison,	Butler.
Kinnick, Frank B.,	Sp. Ag.,	Adel,	Dallas.
Koch, William E.,	Sp. Ag.,	Keystone,	Benton.

Kratz, A. M.,	E. E.,	Sioux City,	Woodbury.
Lacey, C. A.,	M. E.,	Col. Junction,	Louisa.
Landsberg, A.,	E. E.,	Iowa City,	Johnson.
Lasher, A. C.,	E. E.,	Union Grove,	*Illinois.*
Lawson, O. L.,	Ag.,	Living Springs	Pott'ttamie.
Letts, Leona R.,	Sp. Sc.,	Col. Junction,	Louisa.
Lummis, W. P.,	Ag.,	Ames,	Story.
Lummis, G. M.,	Ag.,	Ames,	Story.
Malley, Marie,	G. & D. S.,	Marquisville,	Polk.
Marsh, Herbert,	C. E.,	Humboldt,	Humboldt.
Melton, A. P.,	C. E.,	Nebo,	*Illinois.*
Merritt, M. L.,	Sc.,	Grundy Center	Grundy.
Myers, Joe J.,	Sp.,	Carroll,	Carroll.
Miller, A. A.,	Ag.,	Ogden,	Boone.
Miller, G. W.,	C. E.,	Ames,	Story.
Moody, M. R.,	C. E.,	Greeley,	Delaware.
Moorhouse, O. B.,	M. E.,	Glidden,	Carroll.
Moreland, Carl,	E. E.,	Tipton,	Cedar.
Morrison, M. Ethelda,	Sc.,	Lake City,	Calhoun.
Mosher, Orris,	Sc.,	Walnut,	Pott'ttamie.
Mosier, C. R.,	C. E.,	Des Moines,	Polk.
Munro, W. M.,	E. E.,	Westchester,	*Washington.*
McClain, F. L.,	E. E.,	Fairfield,	Jefferson.
McClellan, Ross J.,	E. E.,	Sappington,	*Montana.*
McClure, Fay,	C. E.,	Ferry,	Mahaska.
McKimm, Effie M.,	G. & D. S.	Ames,	Story.
McKinney, Robert T.,	E. E.,	Cleghorn,	Cherokee.
Needham, Sherman,	Sc.,	Sigourney,	Keokuk.
Nelson, Thomas,	M. E.,	Lansing,	Allamakee.
Nichols, W. S.,	Ag.,	Marshalltown,	Marshall.
Norman, Roy,	M. E.,	Omaha,	*Nebraska.*
Norton, C. W.,	Ag.,	Wilton Junc.,	Muscatine.
Novak, J. W.,	Sp. Ag.,	Williamsburg,	Iowa.
Osborn, W. M.,	Sc.,	Rippey,	Greene.
Otis, H. R.,	E. E.,	Ames,	Story.
Otis, Webb H.,	M. E.,	Ames,	Story.
Overholser, F. E.,	E. E.,	Ames,	Story.
Penny, Warren,	Sc.,	Stacyville,	Mitchell.
Pew, George V.,	M. E.,	LeMars,	Plymouth.
Pielsticker, Fred,	E. E.,	Carroll,	Carroll.
Piersol, J. E.,	Ag.,	Rockwell City,	CerroGordo.
Piersol, Lou,	Sp. Sc.,	Rockwell City,	CerroGordo.
Prien, A. E.,	Sc.,	St. Ansgar,	Mitchell.
Ranney, Thomas C.,	Sc.,	Storm Lake,	Buena Vista.
Reeve, Orilla,	Sc.,	Hampton,	Chickasaw.
Rew, Frank A.,	E. E.,	Corydon,	Wayne.
Reynolds, J. E.,	Ag.,	Williamsburg,	Iowa.
Reynolds, M. C.,	E. E.,	Carlisle,	Warren.
Rice, Fred,	E. E.,	Ames,	Story.

Fitzman, E. G.,	Ag.,	Maquoketa,	Jackson.
Roberts, T. G.,	Ag.,	Marathon,	Buena Vista.
Roland, Clarence,	C. E.,	Adel,	Dallas.
Rounds, Mary,	Sp. Sc.,	Des Moines,	Polk.
Royce, Oscar,	Ag.,	Monticello,	Jones.
Sampson, H. O.,	Sc.,	Mason City,	CerroGordo.
Schuller, B. A.,	E. E.,	Garner,	Hancock.
Scott, Nellie,	G. & D. S.,	Ontario,	Story.
Sims, Soe,	M. E.,	Newton,	Jasper.
Smith, William W.,	Ag.,	Nevada,	Story.
Smith, Roy B.,	E. E.,	Audubon,	Audubon.
Soenke, E. E.,	Sc.,	Davenport,	Scott.
Spalding, Ed.,	E. E.,	Sioux City,	Woodbury.
Starr, Nina,	G. & D. S.,	Ames,	Story.
Starzinger, Otto,	E. E.,	Des Moines,	Polk.
Streeter, Clarke,	C. E.,	Cedar Falls,	Johnson.
Sutton, Arthur,	Sp.,	Ames,	Story.
Tenney, Edgar L.,	M. E.,	Ida Grove,	Ida.
Thomas, D. C.,	M. E.,	Col. City,	Louisa.
Tillson, H. L.,	E. E.,	Boone,	Boone.
Test, Cora,	Sp.,	Whittier,	Linn.
Usry, Eldon,	M. E.,	Des Moines,	Polk.
Vanatta, Maud,	G. & D. S.,	Newton,	Jasper.
Weston, Lawrence,	Sp. Ag.,	Boone,	Boone.
Whisler, A. B.,	E. E.,	Fairmount,	Jasper.
Wilkinson, L. J.,	E. E.,	Milford,	Dickinson.
Williams, W. H.,	E. E.,	Ida Grove,	Ida.
Williams, Charles B.,	C. E.,	Des Moines,	Polk.
Wilson, William J.,	Ag.,	Earlham,	Madison.
Wood, C. R.,	C. E.,	Corwith,	Hancock.
Woodruff, L. W.,	Sc.,	Correctionville,	Woodbury.
Younie, Ethlyn,	G. & D. S.,	Odebolt,	Sac.

FRESHMEN.

NAME.	COURSE.	TOWN.	COUNTY.
Akin, Levi E.,	Vet.,	Ames,	Story.
Aldrich, Clifford,	C. E.,	Creston,	Union.
Allen, R. M.,	Vet.,	Marshalltown,	Marshall.
Anderson, Abel O.,	E. E.,	Lake City,	Calhoun.
Anderson, Harriet,	G. & D. S.	Jewell,	Hamilton.
Arends, Gertrude,	Sc.,	Aplington,	Butler.
Arkills, M. E.,	Sp. E. E.,	Roots Siding.	Butler.
Austin, H. D.,	E. E.,	Prattsburg,	New York.
Austin, Roy L.,	E. E.,	Galva,	Ida.
Bachman, W. C.,	E. E.,	Waterloo,	Blackhawk.
Bachman, Olivia,	Sp.,	Waterloo,	Blackhawk.
Baird, Josephine,	G. & D. S.,	North English,	Iowa.
Bakker, Obbo,	C. E.,	Ackley,	Hardin.

Bannister, Chase,	Sp. M. E.,	Ottumwa,	Wapello.
Bartholomew, C. E.,	Sc.,	Ames,	Story.
Bartholomew, Jeanette,	Sc.,	Ames,	Story.
Beasley, H. B.,	E. E.,	Marshalltown,	Marshall.
Bell, Ray,	Sp. Ag.,	Chicago,	*Illinois.*
Benson, C. M.,	C. E.,	Marshalltown,	Marshall.
Bergman, Roy,	M. E.,	Newton,	Jasper.
Bernick, M. H.,	Sp.,	Davenport,	Scott.
Bevan, Wm. A.,	Sp. Sc.,	Angus,	Boone.
Binnie, J. C.,	Sp. Ag.,	Alta,	Buena Vista.
Bishop, Howard,	M. E.,	Sperry,	Des Moines
Bishop, W. C.,	M. E.,	Sperry,	Des Moines
Blaine, Lela R.,	Sc.,	Council Bluffs,	Pott'ttamie.
Blanch, Alice M.,	Sp. Sc.,	Conrad,	Grundy.
Boardman, C. K.,	Ag.,	Des Moines,	Polk.
Bogert, H. G.,	C. E.,	Paullina,	O'Brien.
Boiler, F. W.,	M. E.,	Muscatine,	Muscatine.
Booth, Nathan,	C. E.,	Harlan,	Shelby.
Borsheim, H. T.,	E. E.,	St. Ansgar,	Mitchell.
Botsford, Walter,	E. E.,	Eureka,	Adams.
Boudinot, A. R.,	E. E.,	Davenport,	Scott.
Bowdish, Chas. B.,	Ag.,	Springville,	Linn.
Bowen, T. J.,	Sp. M. E.,	Hudson,	Blackhawk.
Braden, Milford C.,	C. E.,	Eagle Grove,	Wright.
Brandt, Iva,	G. & D. S.,	Kellogg,	Jasper.
Bridger, Leo J.,	E. E.,	Richland,	Keokuk.
Briley, Mollie,	Sp.,	Ames,	Story.
Brinkerhoff, Moses,	C. E.,	Brayton,	Audubon.
Bristol, Ross,	C. E.,	Cedar Rapids,	Linn.
Brockman, Harvey A.,	Sp. Ag.,	Walcott,	Scott.
Brotherton, L.,	Ag.,	Creston,	Union.
Brown, Nellie L.,	G. & D. S.,	Dexter,	Dallas.
Brown, O. L.,	C. E.,	Lohrville,	Calhoun.
Brown, May,	Sp.,	Gilbert Station,	Story.
Bruce, W. R.,	Sp. Ag.,	Albion,	Marshall.
Brunnier, Henry,	C. E.,	Manning,	Carroll.
Buchanan, A.,	Sp. Ag.,	Mechanicsville	Cedar.
Buchanan, R. C.,	Sc.,	Eagle Grove,	Wright.
Burns, Roscoe,	Vet.,	Iowa City,	Johnson.
Burrows, J. M.,	C. E.,	Des Moines,	Polk.
Butler, Franklin,	Sp. M. E.,	Des Moines,	Polk.
Caldwell, Fred,	E. E.,	Agency,	Wapello.
Cameron, H. J.,	Sc.,	Alta,	Buena Vista
Campbell, Claude,	Sc.,	Ames,	Story.
Campbell, Colin,	Ag.,	Botna,	Shelby.
Carter, W. S.,	Ag.,	Sioux Rapids,	Buena Vista
Cassidy, Eva,	Sp.,	Ames,	Story.
Cessna, Ethyl,	G. & D. S.,	Ames,	Story.
Chapman, William H.,	C. E.,	Independence,	Buchanan.

Church, C. N.,	Ag.,	Marshalltown,	Marshall.
Clampitt, Ralph R.,	Ag.,	New Providence,	Hardin.
Claybaugh, W. C.,	Ag.,	Greenfield,	Adair.
Clutter, Archie,	E. E.,	Farnhamville,	Calhoun.
Clyde, Mary E.,	Sp.,	Osage,	Mitchell.
Clyde, Roy W.,	C. E.,	Osage,	Mitchell.
Coates, A. B.,	E. E.,	Clarinda,	Page.
Coffey, R. C.,	Sc.,	Prairie City,	Jasper.
Cooper, F. C.,	E. E.,	Ogden,	Boone.
Corlette, Bernice, G. & D. S.,		Ames,	Story.
Corlette, Glen H.,	M. E.,	Ames,	Story.
Cotton, Ernest,	C. E.,	Brayton,	Audubon.
Cretsinger, Myrtle, G. & D. S.,		Coon Rapids,	Carroll.
Crouse, F. H.,	Ag.,	Dairyville,	Grundy.
Cummins, William,	Vet.,	New York City,	*New York.*
Curtis, C. E.,	C. E.,	Redfield,	Dallas.
Cutler, James L.,	Ag.,	Osage,	Mitchell.
Danforth, H. G.,	Ag.,	Little Cedar,	Mitchell.
Daws, Roy,	Ag.,	Harlan,	Shelby.
Day, Dudley,	Sc.,	Seward,	*Illinois.*
Dean, H. G.,	E. E.,	Prattsburg,	*New York.*
De Marsha, Pauline,	Sp.,		
Denmead, H. K.,	Ag.,	Marshalltown,	Marshall.
Dickens, Katherine, G. & D. S.,		Hedrick,	Keokuk.
Diller, C. R.,	Ag.,	Marshalltown,	Marshall.
Dinsmore, Wayne,	Ag.,	Ames,	Story.
Dixon, C. O.,	Sp. Ag.,	Stuart,	Guthrie.
Doggett, W. H.,	M. E.,	Ames,	Story.
Dougherty, W.,	Sp. Ag.,	Mechanicsville,	Cedar.
Doyle, George,	M. E.,	Boone,	Boone.
Dumphy, Raymond,	Sp.,	Spokane,	*Washington.*
Duncan, N. C.,	Ag.,	Col. Junction,	Louisa.
Dye, Ralph,	Ag.,	Carson,	Pottawattamie.
Eck, Ralph T.,	E. E.,	Pleasantplain,	Jefferson.
Eddy, Wilbert,	Sc.,	Wesley,	Kossuth.
Eiler, D. W.,	Ag.,	Sioux Rapids,	Buena Vista.
Elder, Ethel W.,	Sp.,	Gosport,	Marion.
Evans, Arthur L.,	E. E.,	Ames,	Story.
Evans, John G.,	E. E.,	Avery,	Monroe.
Evans, Arthur C.,	Vet.,	Castana,	Monona.
Everson, Oscar M.,	Ag.,	Rolfe,	Pocahontas.
Farnham, Ralph,	Sp.,	Charles City,	Floyd.
Fausch, C. P.,	Sc.,	Ames,	Story.
Felter, Vern G.,	Sp. Ag.,	Washta,	Cherokee.
Fisher, G. L.,	M. E.,	Washington,	Washington
Fleming, Mabel,	G. & D. S.,	Traer,	Tama.
Fletcher, Frank W.,	Ag.,	Worcester,	*Mass.*
Ford, Eugene,	Min. Eng.,	Mitchellville,	Polk.
Ford, W. C.,	Sp. Ag.,	Chicago,	*Illinois.*

Francis, A. R.,	Ag.,	Kent,	Union.
Freeberger, Joe F.,	Vet.,	Manson,	Calhoun.
Fritzel, Clinton,	Sc.,	Conrad,	Grundy.
Fuller, Thomas,	Ag.,	Marshalltown,	Marshall.
Garberson, J. H.,	Sc.,	Alta,	Buena Vista.
Gardner, Guy,	M. E.,	Stacyville,	Mitchell.
Gardner, S. B.,	C. E.,	Osage,	Mitchell.
Garretson, Elna,	Sp.,	Sioux City,	Woodbury.
Gaylord, Edith,	Sp.,	Arthur,	Ida.
Gaylord, Lawrence T.,	Sp.C.E.,	Grinnell,	Poweshiek.
Geesman, C. E.,	Ag.,	Middle River,	Madison.
Gersback, E.,	C. E.,	Montezuma,	Poweshiek.
Gilchrist, William,	Vet.,	Ontario,	Story.
Gillespie, Leigh,	E. E.,	Spencer,	Clay.
Gilmore, George,	Ag.,	Ames,	Story.
Girton, Lester T.,	Ag.,	State Center,	Marshall.
Glass, Dale,	E. E.,	Winfield,	Henry.
Graham, Fred M.,	M. E.,	Toledo,	Tama.
Graves, Fred H.,	Ag.,	Harlan,	Shelby.
Gray, Alexander,	M. E.,	Ames,	Story.
Gray, Charles,	Ag.,	Ames,	Story.
Greene, Merritt,	M. E.,	Marshalltown,	Marshall.
Gribben, Ray,	Ag.,	Minburn,	Dallas.
Griffith, Zaidee,	G. & D. S.,	Ames,	Story.
Hammerly, Fred,	M. E.,	Denmark,	Lee.
Hanson, G. H.,	C. E.,	Odebolt,	Sac.
Hardebeck, Orville D.,	C. E.,	Des Moines,	Polk.
Hazelton, Park,	E. E.,	Glidden,	Carroll.
Hauck, H. L.,	Sc.,	Farmersburg,	Clayton.
Hawthorn, Bessie,	Sp.,	Nevada,	Story.
Hayward, Verner,	M. E.,	Davenport,	Scott.
Heavenhill, Mark,	Ag.,	Fox,	*Illinois.*
Hedges, C. R.,	Sp.,	Ames,	Story.
Hillman, Covell,	M. E.,	Grand Junction,	Greene.
Hinsdale, H. V.,	Sp.,	Newton,	Jasper.
Hirschal, S. W.,	C. E.,	Davenport,	Scott,
Hoag, Chas. S.,	C. E.,	Muscatine,	Muscatine.
Hodgson, Harry H.,	M. E.,	Des Moines,	Polk.
Hoeye, Fred,	Sp.,	Perry,	Dallas.
Holden, Arthur C.,	E. E.,	Cherokee,	Cherokee.
Holder, J. A.,	Ag.,	Des Moines,	Polk.
Hollingsworth, Anna,	Sc.,	Sheffield,	Franklin.
Hollis, Alfred,	Vet.,	Des Moines,	Polk.
Houck, A. W.,	Sp. Ag.,	Bedford,	Taylor.
Howard, G. F.,	Ag.,	New Providence,	Hardin.
Howard, Harry,	Ag.,	Ames,	Story.
Howard, Carlotta,	Sc.,	Ames,	Story.
Humphries, J. O.,	E. E.,	Marathon,	Buena Vista.
Hurt, L. M.,	C. E.,	Newton,	Jasper.

Hutchinson, Roy,	Ag.,	Ames,	Story.
Illian, A. L.,	Ag.,	Davenport,	Scott.
Isham, Orson,	Ag.,	Estherville,	Emmet.
Jackson, Ray,	E. E.,	Des Moines,	Polk.
Johnson, F. J.,	Sp. Ag.,	Rolfe,	Pocahontas.
Jones, Clarence,	C. E.,	Creston,	Union.
Jones, Edward,	E. E.,	Tracy,	*Minnesota.*
Jones, John T.,	Sp. Ag.,	LeRoy,	*Minnesota.*
Jordan, J. W.,	Sc.,	Boone,	Boone.
Joy, A. H.,	Vet.,	Mitchell,	Mitchell.
Kelsey, De Ette,	Sp.,	Perry,	Dallas.
Kerwin, Annie,	Sp.,	Ft. Dodge,	Webster.
Kersson, Henry,	Sc.,	Williamstown,	Chickasaw.
Keyser, Ralph,	C. E.,	Atlantic,	Cass.
Kieter, Lida,	Sp.,	Grundy Center,	Grundy.
Kimball, George,	E. E.,	Waterloo,	Blackhawk.
King, Joseph C.,	C. E.,	Muscatine,	Muscatine.
King, Lucy M.,	G. & D. S.,	Bagley,	Guthrie.
King, M. L.,	E. E.,	Bagley,	Guthrie.
Kingkade, Eva,	Sc.,	Ames,	Story.
Kinne, Pearl,	Sp.,	Storm Lake,	Buena Vista.
Konigsmark, F.,	Ag.,	Cedar Rapids,	Linn.
Kooser, J. B.,	Vet.,	Ames,	Story.
Kruidenier, Edward,	Sc.,	Pella,	Marion.
Kuhn, Ada,	Sp.,	Audubon,	Audubon.
Larson, E. V.,	Sc.,	Story City,	Story.
Laughlin, Fred,	Ag.,	Foster,	*Missouri.*
Lewis, F. G.,	Ag.,	Osceola,	Clarke.
Lewis, Oscar E.,	C. E.,	Montezuma,	Poweshiek.
Lewis, R. J.,	C. E.,	Denmark,	Lee.
Lichtenwalter, Bruce,	M. E.,	Toledo,	Tama.
Lincoln, Rush B.,	Sc.,	Ames,	Story.
Lofstedt, O. B.,	C. E.,	Rippey,	Greene.
Lund, A. C.,	Sc.,	St. Ansgar,	Mitchell.
Lundberg, C. J.,	Sp.,	Des Moines,	Polk.
Lundy, George E.,	E. E.,	Marshalltown,	Marshall.
Lyford, L. L.,	C. E.,	Manley,	Worth.
MacCorkindale, A.,	Sc.,	Mason City,	Cerro Gordo
MacDonald, Thomas H.,	C. E.,	Montezuma,	Poweshiek.
Martin, Walter,	Vet.,	Mitchellville,	Polk.
Martin, Lady,	Sp.,	Mitchellville,	Polk.
Masterson, Earl,	Ag.,	North Branch,	Guthrie.
Miller, O. H.,	Sc.,	Des Moines,	Polk.
Miller, Della,	Sp.,	Manchester,	Delaware.
Miller, Claude,	Sp.,	Story.	Story.
Milnes, Genevieve,	G. & D. S.,	Kansas City,	*Missouri.*
Minert, T. R.,	M. E.,	Ames,	Story.
Moffitt, Robert H.,	Min. Eng.,	Des Moines,	Polk.
Moody, L. C.,	M. E.,	Greeley,	Delaware.

Moorhous, B. F.,	C. E.,	Ontario,	Story.
Morris, Charles,	E. E.,	Corning,	Adams.
Morris, Lester,	C. E.,	Corning,	Adams.
Mosier, Rachel,	Sc.,	Des Moines,	Polk.
McCampbell, AlfredK.,	Sp.C.E.,	Oskaloosa,	Mahaska.
McClure, W. E.,	C. E.,	Ames,	Story.
McConnell, Alice,	Sp.,	Ames,	Story.
McCulla, L. G.,	E. E.,	St. Ansgar,	Mitchell.
McFerrin, R. E.,	C. E.,	Montezuma,	Poweshiek.
McGrew, E. S.,	Sp. M. E.,	Grandview,	Louisa.
McKay, Bruce,	Ag.,	Ames,	Story.
McKellar, Don,	E. E.,	Rock Valley,	Sioux.
McKim, Jessie,	Sp.,	Nevada,	Story.
McLain, William,	Ag.,	Ames,	Story.
McMillan, Roscoe M.,	E. E.,	Vinton,	Benton.
McNiff, James,	E. E.,	Danbury,	Woodbury.
McSweeney, J. J.,	Vet.,	Newell,	BuenaVista.
McVicker, J. R.,	Sp.,	Sigourney,	Keokuk.
Naylor, Harry,	Ag.,	Clear Lake,	CerroGordo.
Nelson, Fred O.,	Ag.,	Toledo,	Tama.
Newcom, O. B.,	Sc.,	Odebolt,	Sac.
Newcom, R. B.,	Sc.,	Odebolt,	Sac.
Newell, Hugh,	Sp. Ag.,	Col. Junction,	Louisa,
Nichols, Harry M.,	Sp. E. E.,	Panora,	Guthrie,
Nichols, S. S.,	E. E.,	Marshalltown,	Marshall.
Nicholas, Arthur B.,	M. E.,	Williamsburg,	Iowa.
Noble, Guy,	E. E.,	Albia,	Monroe.
O'Brien, Roy,	M. E.,	Ames,	Story.
O'Hearn, J. L.,	C. E.,	Grinnell,	Poweshiek.
Okey, F. M.,	C. E.,	Prescott,	Adams.
Oldis, Thomas,	Sp.,	Castana,	Monona.
Otis, Wynn,	E. E.,	Malvern,	Mills.
Overholser, Alice,	G. & D. S.,	Ames,	Story.
Packer, W. T.,	Ag.,	Sherwood,	Calhoun.
Packer, Chas. F.,	Ag.,	Sherwood,	Calhoun.
Packer, Marion,	Ag.,	Sherwood,	Calhoun.
Packer, Joseph,	Ag.,	Marshalltown,	Marshall.
Page, M. L.,	M. E.,	Charles City,	Floyd.
Painter, Earl,	Ag.,	Spencer,	Clay.
Palmer, Florence,	Sp.,	Toledo,	Tama.
Palmer, Ida,	Sp.,	Highview,	*Missouri.*
Parker, L. M.,	E. E.,	Marshalltown,	Marshall.
Park, C. G.,	Ag.,	Cedar Falls,	Black Hawk.
Parks, P. C.,	Ag.,	Orangeburg,	*So. Carolina.*
Parks, Lila,	Sp.,	Creston,	Union.
Parsons, Millie,	Sp.,	Ames,	Story.
Patton, Ruby,	G. & D. S.,	Dexter,	Dallas.
Paxton, Irving,	E. E.,	Ames,	Story.
Peck, Walter,	M. E.,	Ottumwa,	Wapello.

Peck, James L.,	Sc.,	McCallsburg,	Story.
Penney, A. C.,	Ag.,	Staceyville,	Mitchell.
Perkins, Florence,	Sp. Sc.,	Ames,	Story.
Phelps, E. R.,	Sc.,	Ames,	Story.
Phillips, Paul D.,	M. E.,	Newton,	Jasper.
Phillips, Walter E.,	Sp. E. E.,	Keokuk,	Lee.
Phillips, Orpha,	Sp.,	Ames,	Story.
Pierce, Bertha,	G. & D. S.,	Perry,	Dallas.
Pillsbury, Clinton,	Sc.,	Milford,	Dickinson.
Pishel, M. A.,	Min. Eng.,	Laurel,	Marshall.
Plumley, Geo. M.,	Sp. Ag.,	Springville,	Linn.
Poage, Lucian,	M. E.,	Newton,	Jasper.
Porter, G. L.,	Sp. Sc.,	Ft. Atkinson,	*Wisconsin.*
Post, Vivian,	Sp.,	Moulton,	Appanoose.
Prall, Jessie B.,	Sp.,	Ames,	Story.
Prichett, John,	Sp. M. E.,	Ft. Madison,	Lee.
Proctor, Glenn J.,	C. E.,	Fairydale,	*Illinois.*
Puderbaugh, S. O.,	Ag.,	Ames,	Story.
Rapp, Edith,	Sc.,	Osage,	Mitchell.
Raymond, L. B.,	Sc.,	Hampton,	Franklin.
Reinecke, Richard,	E. E.,	Elkader,	Clayton.
Reints, Katherine,	Sp.,	Aplington,	Butler.
Repp, Geo.,	Vet.,	Ames,	Story.
Rhinehart, Estella,	G. & D. S.,	Dallas Center,	Dallas.
Rice, F. L.,	E. E.,	Ames,	Story.
Ricker, Frank H.,	Sp. E. E.,	Grinnell,	Poweshiek.
Ricksher, William,	E. E.,	Fairfield,	Jefferson.
Riggs, Harlan,	Ag.,	Newbern,	Marion.
Riley, Ethel,	G. & D. S.,	Exira,	Audubon.
Ritenour, Ella B.,	Sp.,	Webster City,	Hamilton.
Roadman, M. W.,	M. E.,	Dairyville,	Grundy.
Robinson, Lee,	E. E.,	Waterman,	*Illinois.*
Rogers, Charlotta,	G. & D. S.,	Ames,	Story.
Rosenberger, M.,	Vet.,	Mitchellville,	Polk.
Ross, O. N.,	M. E.,	Williams,	Hamilton.
Ross, Ellis,	Sc.,	Calumet,	O'Brien.
Rowat, James A.,	C. E.,	Des Moines,	Polk.
Rowe, Louise,	G. & D. S.,	Boone,	Boone.
Roup, C. J.,	Sc.,	Charter Oak,	Crawford.
Rubel, C. W.,	Ag.,	Kirkville,	Wapello.
Russell, Lester W.,	Vet.,	Anamosa,	Jones.
Tims, Edwin,	Ag.,	New York,	*New York.*
Tims, Adelaide,	Sp.,	New York,	*New York.*
Titus, Elsie,	Sc.,	Grundy Center,	Grundy.
Tourgee, C. H.,	Ag.,	Arthur,	Ida.
Trost, F. W.,	C. E.,	Ottumwa,	Wapello.
Tracy, Paul,	Sp.,	Steamboat Rock,	Hardin.
Van Houten, A. W.,	Sp. Sc.,	Des Moines,	Polk.
Von Krog, Meta,	Sp.,	Boone,	Boone.

Sage, A. W.,	M. E.,	Denison,	Crawford.
Scranton, J. B.,	C. E.,	Boone,	Boone.
Schiele, Arthur,	Sp. Ag.,	Bluegrass,	Scott,
Schooley, C. A.,	M. E.,	West Liberty,	Muscatine.
Schmidt, Elizabeth,	Sc.,	Alton,	Sioux.
Schwab, J. W.,	Ag.,	Stilson,	Hancock.
Schwarting, Martha,	Sp. Sc.,	Walcott,	Scott.
Schwarting, Walter,	E. E.,	Walcott,	Scott.
Scott, Archie B.,	E. E.,	Shelby,	Shelby.
Scott, A. Hugh,	E. E.,	Muscatine,	Muscatine.
Scranton, H. L.,	E. E.,	Gilmore City,	Pocahontas.
Shaff, John O.,	Ag.,	Folletts,	Clinton.
Shields, J. C.,	Sc.,	Allerton,	Wayne.
Shields, John E.,	C. E.,	Plainfield,	Bremer.
Shipman, C. E.,	C. E.,	West Liberty,	Muscatine.
Shoemaker, W. A.,	E. E.,	Marshalltown,	Marshall.
Shreve, Earl O.,	E. E.,	Charter Oak,	Crawford.
Siddall, Blanch,	Sp.,	Nevada,	Story.
Simpson, Charles D.,	M. E.,	Wall Lake,	Sac.
Skinner, Alice,	Sc.,	Sioux Rapids,	Buena Vista
Skrable, Frank,	Ag.,	Elberon,	Tama.
Slater, Bird,	G. & D. S.,	Ames,	Story.
Slutz, C. S.,	E. E.,	Galva,	Ida.
Smith, A. J.,	E. E.,	Corning,	Adams.
Smith, Clement H.,	Sc.,	Des Moines,	Polk.
Smith, Henry H.,	Ag.,	Marshalltown,	Marshall.
Smith, Harry P.,	E. E.,	Seymour,	Wayne.
Smith, A. D.,	Ag.,	Ames,	Nebraska.
Smith Mayme,	G. & D. S.,	Marshalltown,	Marshall.
Smith, Harriett,	Sp.,	Webster City,	Hamilton.
Snyder, R.,	Vet.,	Dixon,	Scott.
Sperry, Arthur,	E. E.,	Grundy Center	Grundy.
Stageberg, Martin,	M. E.,	Jewell,	Hamilton.
Starr, Nettie,	G. & D. S.,	Maxwell,	Story.
Steel, Herbert,	Sc.,	Richland,	Keokuk.
Stewart, Mabelle,	Sp.,	Ames,	Story.
Stevens, Edith,	Sc.,	Boone,	Boone.
Stone, Robert,	E. E.,	Redfield,	Dallas.
Stone, Earl,	Ag.,	Massena,	Cass.
Stough, F G.,	E. E.,	Ida Grove,	Ida.
Stout, Margaret,	Sp.,	Stout,	Grundy.
Suksdorf, W. H.,	Min. Eng.,	Davenport,	Scott.
Sumner, William D.,	E. E.,	Ottumwa,	Wapello.
Summers, John F.,	Ag.,	Melbourne,	Marshall.
Taggart, Laura,	G. & D. S.,	State Center,	Marshall.
Tarr, J. W.,	Ag.,	Iconium,	Appanoose
Tellier, Herbert O.,	Ag.,	Humboldt,	Humboldt.
Terrill, Katherine,	G. & D. S.,	Grand Junc	Greene.
Thomas, D. J.,	Sp. Min.,	Colfax,	Jasper.
Thomas, Harris,	E. E.,	Rolfe,	Pocahontas.
Thompson Winifred,	G.&D. S.,	Cambridge,	Story.
Thornburg, M. G.,	C. E.,	Linden,	Dallas.
Tibbetts, Charles,	E. E.,	Toledo,	Tama.

Waggoner, Geo.,	E. E.,	Primghar,	O'Brien.
Walker, J. E.,	Sp. Ag.,	Marshalltown,	Marshall.
Walter, C. D.,	C. E.,	Humboldt,	Humboldt.
Warren, F. B.,	M. E.,	Boone,	Boone.
Watts, Alice,	Sc.,	Ames,	Story.
Watson, G. H.,	Sp. Ag.,	Archer,	O'Brien.
Weed, Roland R.,	E. E.,	Charter Oak,	Crawford.
Weindall, G. A.,	E. E.,	Covington,	*Kentucky.*
Welch, Ira J.,	Sc.,	Des Moines,	Polk.
Wells, Reine G.,	G. & D. S.,	Nevada,	Story.
Wells, C. H.,	C. E.,	Boone,	Boone.
White, Edna,	Sp.,	Charles City,	Floyd.
Wickham, J. Q.,	C. E.,	Zearing,	Story.
Wilbur, Howard,	E. E.,	Marshalltown,	Marshall.
Wilhelm, C. D.,	E. E.,	Conrad,	Grundy.
Williams, H. L.,	E. E.,	Fulton,	*Illinois.*
Willis, B. S.,	E. E.,	Des Moines,	Polk.
Wilson, C. B.,	C. E.,	Cherokee,	Cherokee.
Wilson, R. C.,	E. E.,	Mitchellville,	Polk.
Wilson, R. P.,	Vet.,	Ottumwa,	Wapello.
Witter, Marvin,	M. E.,	Roscoe,	*So. Dakota.*
Wood, R. D.,	Sp. Sc.,	Prairie City,	Jasper.
Wood, Roy B.,	Sp. Ag.,	New Providence,	Hardin.
Woodward, C. W.,	M. E.,	Manilla,	Crawford.
Woodman, Lois,	G. & D. S.,	Dexter,	Dallas.
Woody, A. E.,	M. E.,	Monroe,	Jasper.
Wormley, Patience,	Sp.,	Newton,	Jasper.
Wright, John G.,	C. E.,	Ames,	Story.
Young, A. L.,	E. E.,	Manson,	Calhoun.
Zimbelman, Edna,	Sp.,	Boone,	Boone.

ACADEMIC.

NAME.	COURSE.	TOWN.	COUNTY.
Adamson, Oliver.	Sc.,	Ankeny,	Polk.
Adamson, Arthur,	Sc.,	Ankeny,	Polk.
Albin, May,	Sc.,	Dallas Center,	Dallas.
Allen, C. F.,	C. E.,	Boone,	Boone.
Anderson, J. L.,	E. E.,	Komstock,	*So. Dakota.*
Anthony, Horace F.,	C. E.,	Camanche,	Clinton.
Arthur, Ernest E.,	Sc.,	Millersburg,	Iowa.
Ashby, Horace,	Ag.,	Creston,	Union.
Ashby, John,	Ag.,	Creston,	Union.
Atherton, A. C.,	E. E.,	Letts,	Louisa.
Barnett, Edward,	C. E.,	Macedonia,	Pottawattamie.
Barrett, W. P.,	Sc.,	Osage,	Mitchell.
Barrett, J. J.,	Sp. Min. E.,	Mystic,	Appanoose.
Beisell, W. D.,	C. E.,	Traer,	Tama.
Blackwood, Earl,	Sc.,	Newton,	Jasper.

Bliss, Ralph K.,	Ag.,	Polm,	Ringgold.
Bloomer, G. W.,	Sc.,	Letts,	Louisa.
Bock, Arthur,	M. E.,	Ft. Madison,	Lee.
Bock, Jerome,	M. E.,	Ft. Madison,	Lee.
Boice, W. T.,	Ag.,	Republic,	Chickasaw.
Brintnall, Earl,	Sc.,	Winthrop,	Buchanan.
Brockman, Harry,	E. E.,	Walcott,	Scott.
Bryant, William E.,	M. E.,	Ames,	Story.
Bush, Earl B.,	Sp.,	Knoxville,	Marion.
Cain, Chester G.,	C. E.,	Scranton,	Greene.
Callahan, Ethel,	G. & D. S.,	Chariton,	Lucas.
Cammack, Albert,	E. E.,	Salem,	Henry.
Cassidy, Robert,	Ag.,	Ames,	Story.
Caughey, R. I.,	E. E,.	Ames,	Story.
Caughey, J. A. I.,	Min. E.,	Ames,	Story.
Caughey, J. W.,	M. E.,	Ames,	Story.
Cessna, Frank,	E. E.,	Ames,	Story.
Christie, William O.,	E. E.,	Oskaloosa,	Mahaska.
Clasey, Clara,	G. & D. S.,	Marble Rock,	Floyd.
Claussen, Carl,	M. E.,	Ogden,	Boone.
Coggshall, Frank,	M. E.,	Cambridge,	Story.
Cole, Mildred,	Sc.,	Ames,	Story.
Cole, Walter B.,	M. E.,	Ames,	Story.
Conlin, C. B.,	E. E.,	Owatonna,	*Minnesota.*
Cooper, Robert,	E. E.,	Saybrook,	*Illinois.*
Cook, Clarence R.,	M. E.,	Des Moines,	Polk.
Corlette, G. H.,	M. E.,	Ames,	Story.
Cox, Ralph L.,	C. E.,	Geneseo,	*New York.*
Craig, Earl H,.	M. E.,	Des Moines,	Polk.
Craig, G. R.,	Sp. Ag.,	Ft. Madison,	Lee.
Creelman, Lander,	C. E.,	Mediapolis,	Des Moines.
Danforth, J. M.,	M. E.,	Little Cedar,	Mitchell.
Davis, Dwight,	Sp.,	Ames,	Story.
Dean, Hattie M.,	Sp.,	Mason City,	Cerro Gord
DeHart, Mabel,	G. & D. S.,	Vernon,	Van Buren.
Dorland, Merle,	G. & D. S.,	West Union,	Fayette.
Dow, Clare A.,	E. E.,	Garner,	Hancock.
Downie, Fred J.,	E. E.,	Garner,	Hancock.
Dryden, Charles,	Eng.,	Montezuma,	Poweshiek.
Ebersole, Oral M.,	E. E.,	Toledo,	Tama.
Eddleman, Marvin,	Ag.,	Altoona,	Polk.
Ellis, Grace,	G. & D. S.,	Ames,	Story.
Farwell, George,	M. E.,	Ames,	Story.
Folger, Lester,	Sc.,	Ames,	Story.
Foote, Robert O.,	Eng.,	Waterloo,	Blackhawk.
Ford, C. H.,	C. E.,	Estherville,	Emmett.
Fulghum, Cecil,	M. E.,	Mason City,	Cerro Gordo.
Gillette, Opal,	Sc.,	Fostoria,	Clay.
Gillette, Roy N.,	Sc.,	Fostoria,	Clay.

Gilmore, William,	Sc.,	Ames,	Story.
Groves, Ralph,	Sp. M. E.,	Ft. Madison,	Lee.
Grose, Irma,	Sp.,	Ames,	Story.
Gruver, Frank E.,	Ag.,	Ames,	Story.
Hahn, G. W.,	C. E.,	Davenport,	Scott.
Hanson, Jacob,	Sc.,	Wesley,	Kossuth.
Harrington, A. R.,	M. E.,	Ontario,	Story.
Haskin, Walter A.,	Sc.,	Whitten,	Hardin.
Hegland, Bertha,	Sp.,	Roland,	Story.
Hendrix, L. D.,	Sp. Ag.,	Letts,	Louisa.
Heston, Myron,	E. E.,	Pleasantplain,	Jefferson.
Hill, Elizabeth,	G. & D. S.,	Des Moines,	Polk.
Hoggatt, E. H.,	E. E.,	Ames,	Story.
Homans, C. B.,	M. E.,	Fairfax,	Linn.
Hook, William,	M. E.,	Hedrick,	Keokuk.
Howe, Fred B.,	M. E.,	Radcliffe,	Hardin.
Jenks, Fred,	E. E.,	Lake City,	Calhoun.
Johnson, Oliver,	Ag.,	Primghar,	O'Brien.
Johnson, Albert C.,	Sc.,	Dana,	Greene.
Jones, William,	E. E.,	Montevista,	*Colorado.*
Jones, Floyd,	C. E.,	Redfield,	Dallas.
Jorgenson, Frank,	M. E.,	Vail,	Crawford.
Kaynor, Karl,	M. E.,	Wilmette.	*Illinois.*
Kempler, Charles,	Sp. Eng.,	Des Moines.	Polk.
Kennedy, Lena,	Sc.,	Collins,	Story.
Kennedy, May,	Sc.,	Collins,	Story.
Kershner, Ernest T..	Sp. Sc.,	Dana,	Greene.
Kerr, Linnie B.,	G. & D. S.,	Pittsburg,	Van Buren.
King, Geo. E.,	C. E.,	Toledo,	Tama.
Knickerbocker, Chas. J.,	E. E.,	Fairfax,	Linn.
Knowles, Harry,	E. E.,	Kingsley,	Plymouth.
Kuhn, William H.,	E. E.,	Council Bluffs,	Pott'ttamie.
Ladd, Penn M.,	Ag.,	Anamosa,	Jones.
Larson, L. L.,	Sc.,	St. Ansgar,	Mitchell.
Larson, Carl,	Sc.,	Meltonville,	Worth.
Larson, Phoebe,	G. & D. S.,	Slater,	Story.
Larson, Marvel,	G. & D. S.,	Slater,	Story.
Lasher, J. W.,	E. E.,	Cushing,	Woodbury.
Lesch, Herman,	E. E.,	Rudd,	Floyd.
Lewis, Walter,	E. E.,	Shellsburg,	Benton.
Lewis, J. H.,	Sp. M. E.,	Montezuma,	Poweshiek.
Lodwick, G.,	Sp. Min.,	Willard,	Wapello.
London, L. R.,	Sp. M. E.,	Altoona,	Polk.
Lund, Jennie,	G. & D. S.,	St. Ansgar,	Mitchell.
Lungren, Oscar E.,	M. E.,	Lena,	Webster.
Lyon, Laten G.,	M. E.,	Grand Junction,	Greene.
Mabie, Ira W.,	Sc.,	Freeman,	Cerro Gordo.
Mabie, Arthur,	M. E.,	Freeman,	Cerro Gordo.
Martin, True,	Sp. M. E.,	Des Moines,	Polk.

Maxwell, R. W.,	Sp. Ag.,	Oakland,	Pottawattamie.
Miller, F. H.,	M. E.,	Clinton,	Clinton.
Moffitt, Mabel,	G. & D. S.,	Ames,	Story.
Morris, L. T.,	Sp. Sc.,	Ireton,	Sioux.
Mosier, Agnes,	Sc.,	Sioux Rapids,	Buena Vista.
Mummey, George P.,	M. E.,	Boone,	Boone.
McClure, C. C.,	Sc.,	Douds,	Van Buren.
McGuire, Harry N.,	C. E.,	Agency,	Wapello.
McLaren, John B.,	Sc.,	Galva,	Ida.
McKinlay, Marie,	Sc.,	Clear Lake,	Cerro Gordo.
Nash, C. W.,	C. E.,	Luverne,	Kossuth.
Nath, Chas.,	M. E.,	Bouton,	Dallas.
Nelson, J. A.,	M. E.,	Ames,	Story.
Nelson, Alice N.,	Sc.,	Ames,	Story.
Nichols, Charles,	C. E.,	Minerva,	Marshall.
Novak, Lewis A.,	Sp.,	Conover,	Winneshiek
Olson, Lida,	Sc.,	Ames,	Story.
Overholser, Pearl,	Sc.,	Ames,	Story.
Pacha, Joseph P.,	E .E.,	Pleasantplain,	Jefferson.
Parsons, Daisy,	G. & D. S.,	Ames,	Story.
Percival, Garth,	M. E.,	Des Moines,	Polk.
Perry, Frank,	Sc.,	Ames,	Story.
Peterson, G. C.,	C. E.,	Harlan,	Shelby.
Pettinger, Celestine,	Sp. Sc.,	Cumberland,	Cass.
Pickworth, Felix F.,	C. E.,	Anamosa,	Jones.
Pillsbury, H. S.,	Sc.,	Milford,	Dickinson.
Plummer, Clyde,	E. E.,	Springville,	Linn.
Prather, C. M.,	E. E.,	Chariton,	Lucas.
Prime, Vera,	Sc.,	Ames,	Story.
Rae, Eva,	Sc.,	Sioux Rapids,	Buena Vista.
Ralston, F. N.,	Sp. Ag.,	Argo,	Scott.
Reese, Edward A.,	E. E.,	Des Moines,	Polk.
Reidesel, Hubert,	M. E.,	Lake City,	Calhoun.
Reinbott, Charles,	Ag,	Grinnell,	Poweshiek.
Reinboldt, J. H.,	C. E.,	Manning,	Carroll.
Roberts, Vernon,	Sc.,	Williamsburg,	Iowa.
Rowley, Fred,	Sc.,	Hawarden,	Sioux.
Rowley, Harry,	E. E.,	Hawarden,	Sioux.
Rubel, O. J.,	C. E.,	Marshalltown,	Marshall.
Rundall, Mabel,	Sc.,	Rodman,	Palo Alto.
Schiele, Arthur,	E. E.,	Bluegrass,	Scott.
Schnellbacher, C.,	C. E.,	Lake City,	Calhoun.
Schuler, Oliver,	C. E.,	Zearing,	Story.
Scott, J. Ada,	Sc.,	Ontario,	Story.
Scott, J. R.,	Ag.,	Elwell,	Grundy.
Secor, Ernest,	E. E.,	Melbourne,	Boone.
Severance, Gertrude,	G.&D.S.,	Grundy Center	Van Buren.
Shull, Louis C.,	C. E.,	Boone,	Boone.
Silver, J. C.,	Sp. Ag.,	Cantril,	Van Buren.

Simpson, George P.,	M. E.,	Nevada,	Story.
Smith, Walton, L.,	E. E.,	Council Bluffs,	Pott'ttamie.
Smith, Howard,	E. E.,	Nashua,	Chickasaw.
Smith, L D.,	M. E.,	LeMars,	Plymouth.
Schneider, C. J.,	C. E.,	Grand View,	Louisa.
Spellisy, J. J.,	M. E.,	DeWitt,	Clinton.
Stebbins, Mary E.,	Sp,	Ellsworth,	Hamilton.
Stephenson, Wade,	M E.,	Somers,	Calhoun.
Sterrett, C. O.,	M. E.,	Oskaloosa,	Mahaska.
Sterling, J. M.,	M. E.,	Ames,	Story.
Stearns, Mabel,	G & D. S.,	Steamboat Rock,	Hardin.
Stevens, Vern V.,	M. E.,	Dubuque,	Dubuque.
Stewart, Katherine,	Sp.,	Ames,	Story.
Stockdale, Guy,	Ag.,	Walcott,	Scott.
Stotts, H. C.,	C. E.,	Perry,	Dallas.
Strait, Geo.,	E. E.,	Des Moines,	Polk.
Stuart, A. A.	Sc.,	Wall Lake.	Sac.
Sullivan, F E.	E. E.,	Elma,	Howard.
Swem, Raymond,	M. E.,	Cedar Rapids,	Linn.
Symonds, Fred,	Sp. Eng.,	Dewey,	Cass.
Talbot, C. F.,	M. E.,	Williamsburg,	Iowa.
Tener, W. I.,	Ag.,	Brevard,	*No. Carolina*
Thompson, R. D.,	C. E.,	Ames,	Story.
Thul, William,	M. E.,	Ames,	Story.
Tillotson, Edwin,	E. E.,	Inwood,	Story.
Torres, Gonzalo,	Ag.,	Leon,	*Mexico.*
Tracy, Robert,	M. E.,	Belle Plaine,	Benton.
Tripp, C. S.,	Sc.,	Newton,	Jasper.
Underwood, Sadie,	Sp.,	Ames,	Story.
Ulibarri, Ricardo,	Ag.,	Leon,	*Mexico.*
Van Duzer, Pearl,	G. & D. S.,	Ontario,	Story.
Van Duzer, Guy,	Sc.	Ontario,	Story.
Vibber, H. R.,	C. E.,	Grandview,	Louisa.
Ward, C. E.,	E. E.,	Marshalltown,	Marshall.
Warden, Marvin,	C. E.,	Vancleve,	Marshall.
Walker, Ruth,	G. & D. S.,	Osage,	Mitchell.
Walkey, C. B.,	M. E.,	Freeport,	*Illinois.*
Wallace, Guy,	M. E.,	Dallas Center,	Dallas.
Walters, Blanch,	G. & D. S.,	Ames,	Story.
Walton, W. L.,	E. E.,	New Providence,	Hardin.
Warner, George F.,	E. E.,	Ottumwa,	Wapello.
Warren, Carroll,	C. E.,	Knoxville,	Marion.
Wichman, John,	E. E.,	Walcott,	Scott.
Wilhelm, Clyde,	Sc.,	Conrad,	Grundy.
Wilkes, Rollo,	C. E.,	Folletts,	Clinton.
Williams, [illegible] L.,	M. E.,	Cedar Rapids,	Linn.
Williams, Milo,	E. E.,	Manley,	Worth.
Wilson, Robert E.,	Ag.,	Elliston,	Ringgold.
Woodard, D. C.,	E. E.,	Des Moines,	Polk.

Woodruff, Theressa,	Sc.,	Ames,	Story.
Woodruff, Benjamin B.,	M. E.,	Ames,	Story.
Wright, Arthur E.,	E. E.,	Ames,	Story.
Wymore, Pearl,	Sc.,	Barnes City,	Mahaska.

DAIRY STUDENTS, 1900-1901.

NAME.	TOWN.	COUNTY.
Bailey, M. G.,	Wiota,	Cass.
Bates, E. J.,	Waubeek,	Linn.
Battinger, George,	Hedrick,	Keokuk.
Boland, John,	Elkader,	Clayton.
Bopp, C. L.,	Hawkeye,	Fayette.
Borland, G. W.,	Hawkeye,	Fayette.
Brown, R. E.,	Shopiere,	*Wisconsin.*
Buchland, N. L.,	Shopiere,	*Wisconsin.*
Burtis, J. L.,	Bancroft,	*Minnesota.*
Byrne, G. P.,	Hawkeye,	Fayette.
Callahan, B. O.,	Chariton,	Lucas.
Chenoweth, Guy,	Henry,	*So. Dakota.*
Clemmenson, Jens,	Harlan,	Shelby.
Christenson, A.,	Ames,	Story.
Colee, E. B.,	Keokuk,	Lee.
Crusinberry, F. J.,		
Curtiss, George,	Iveyville,	Adams.
Cox, A. R.,		
Dawes, J. L.,	Harlan,	Shelby.
Denckner, Lofus H.,	Sheldon,	*Connecticut.*
Dupont, P. J.,	St. Donatus,	Jackson.
Elsen, W.,	Lizard,	Pocahontas.
Endvolsen, Michael,	Story City,	Story.
Fagan, John,	Spirit Lake,	Dickinson.
Fanselow, Ben,	Rowen,	Wright.
Fisk, James A.,	Sterling Center,	*Minnesota.*
Frutchey, R. T.,	Gladbrook,	Tama.
Gardner, G. W.,	Fairfield,	Jefferson.
Gish, David,	Manhattan,	*Kansas.*
Gimer, A. D.,	Abbott,	Hardin.
Golden, William,	Neptune,	Plymouth.
Goodell, B. J.,	Rutland,	Humboldt.
Gustin, O. J.,	Shannon City,	Union.
Hillman, Geo.,	Lytton,	Sac.
Hesla, S. E.,	Orsland,	Buena Vista
Heiden, Louis,	Hart,	*Minnesota.*
Holtgrave, Martin,	Breese,	*Illinois.*
Honstrom, A. W.,	Berkeley,	Boone.
Jenson, Martin,	St. Ansgar,	Mitchell.
Keachie, James L.,	Galt, Wentworth	*Ontario.*
Knudsen, N. H.,	Emmetsburg,	Palo Alto.

Kusler, Adam,	Parkston,	*So. Dakota.*
Kindberg, Alfred,	Kindberg,	*Indiana.*
Larson, Lewis,	Canton,	*Kansas.*
Manuel, P. F.,	Corley,	Shelby.
Martens, E. M.,	Lost Nation,	Clinton.
Menzies, George,	Molesworth,	Perth, *Canada*
Mills, L. L.,	Morgan,	*Missouri.*
Mills, Cecil,	Herman,	*Nebraska.*
Moede, Herman,	Sanborn,	O'Brien.
Montag, Charley,	Sac City,	Sac.
Moody, Ralph,	Belmond,	Wright.
Morrow, O. T.,	Douds,	Van Buren.
McColly, Frank,	Ames,	Story.
Neilson, L.,	Jewell Junction,	Hamilton.
Newman, B. W.,	Elgin,	*Illinois.*
Olson, N. C.,	Linn Grove,	BuenaVista.
Peterson, Peter J.,	Story City,	Story.
Peterson, S.,	New Hampton	Chickasaw.
Rae, Robert,	Dewey,	Cass.
Rapp, C. A.,	Shannon City,	Union.
Reists, W. C.,	Panther,	Dallas.
Roberts, Lee L.,	Shannon City,	Union.
Sasseen, Howard,	Dewey,	Cass.
Schettler, Herman,	Madison,	*Wisconsin.*
Schulte, B. W.,	Dorchester,	Allamakee.
Schulte, John F.,	Hudson,	Blackhawk.
Skinner, Harry,	Vernon Center	*New York.*
Smith, C. A.,	Manson,	Calhoun.
Spencer, H.,	Stratfordville,	*Kansas.*
Stebbleton, J. R.,	Rolfe,	Pocahontas.
Steward, Simeon,	Berkeley,	Boone.
Stockwell, C. W.,	Clark's Grove.	*Minnesota.*
Story, Lester,	Garrison,	Benton.
Sudendorf, E.,	Elgin,	*Illinois.*
Swartzendruver, A. H.,	Rippey,	Greene.
Thielke, August,	Carroll,	Carroll.
Uhling, E. L.,	Shopiere,	*Wisconsin.*
Van Houten, O. C.,	Des Moines,	Polk.
Vittum, Clarence,	Reinbeck,	Grundy.
Waller, Andrew,	Dunnville,	*Wisconsin.*
Wendt, C. H.,	North Star,	*Minnesota.*
Wheeler, F. P.,	Chariton,	Lucas.
White, Frank,	Angus,	Boone.
Yerty, A. W.,	Fairfield,	Jefferson.

LIST OF STUDENTS AT STOCK JUDGING SCHOOL, JANUARY, 1901.

NAME.	TOWN.	COUNTY.
Akin, M. R.,	Toledo,	Iowa.
Allen, R. J.,	Lehigh,	Iowa.
Anderson, A. S.,	Alsen,	*So. Dakota.*
Anderson, Robert,	Gowrie,	Iowa.
Allbee, Erwin,	Pleasant Prairie,	Iowa.
Banks, G. R.,	State Center,	Iowa.
Burge, G. H.,	Mt. Vernon,	Iowa.
Bollard, Jos.,	Ames,	Iowa.
Brunner, Wm.,	Marble Rock,	Iowa.
Barkley, Geo. E.,	Wall Lake,	Iowa.
Banks, A. J.,	Montour,	Iowa.
Blaser, M. J.,	Odebolt,	Iowa.
Bruce, G. T.,	Albion,	Iowa.
Bixler, John M.,	Brooks,	Iowa.
Botts, Leo,	Plymouth,	*Illinois.*
Bryan, Clarence,	Dow City,	Iowa.
Berkhoff, Chas.,	Wapello,	Iowa.
Bollman, W. E.,	Lime Springs,	Iowa.
Brittain, A. C.,	Peiro,	Iowa.
Baker, J. R.,	Pleasant Prairie,	Iowa.
Bernick, F. R.,	Pleasant Prairie,	Iowa.
Brod, L. A.,	Talmage,	*Nebraska.*
Battman, J. A.,	Ames,	Iowa.
Bitterman, E. L.,	Nora Springs,	Iowa.
Bennett, C. E.,	Ames,	Iowa.
Cadwell, H. C.,	Logan,	Iowa.
Coon, W. P.,	Ames,	Iowa.
Coffman, Lee,	Ames,	Iowa.
Caldwell, C. C.,	White Oak,	Iowa.
Carbee, H. C.,	Springville,	Iowa.
Chadima, G. C.,	Danforth,	Iowa.
Cox, E. R.,	Manlo,	Iowa.
Carmichael, John,	Earling,	Iowa.
Cannon, W. R.,	Wyman,	Iowa.
Carlson, Ed.,	Kiron,	Iowa.
Cattell, N. H.,	West Branch,	Iowa.
Campbell, J. E.,	Ames,	Iowa.
Chandler, G. C.,	Fairfield,	Iowa.
Chapman, L.,	Cambria,	Iowa.
Corwin, F. W.,	Highmore,	*So. Dakota.*
Craig, Chas.,	Mitchellville,	Iowa.
Converse, Myron,	Cresco,	Iowa.
Crawford, M. R.,	Indianola,	Iowa.
Cain, Lincoln,	Swea City,	Iowa.
Craig, Geo.,	St. Anthony Park,	*Minnesota.*

Cripliver, J. R.,	Tipton,	Iowa.
Cooke, Thos. F.,	Algona,	Iowa.
Cochran, I. V.,	Wright,	Iowa.
Davis, C. F.,	Gilbert,	Iowa.
Day, F. P..	Hoyt,	Iowa.
Daly, P. B.,	Amber,	Iowa.
Davis, H. C.,	Ames,	Iowa.
Davis, H. M.,	Ames,	Iowa.
Dorr, Henry,	Marcus,	Iowa.
Dosh, Roy H.,	Stuart,	Iowa.
Dixon, Chas. H.,	Stuart,	Iowa.
Dodds, T. A.,	Gilbert Station,	Iowa.
Dieterich, V. E.,		
Eckles, M.,	Marshalltown,	Iowa.
Eckstein, F. A.,	Chester,	Iowa.
Elliott, A. B.,	Whiting,	Iowa.
Erickson, Emil,	Gowrie,	Iowa.
Escher, F. C.,	Harlan,	Iowa.
Edris, Frank M.,	Oskaloosa,	Iowa.
Edwards, John,	Exira,	Iowa.
Eastburn, J. O.,	So. Ottumwa,	Iowa.
Fillenworth, J. C.,	Adair,	Iowa.
Fricke, E. A.,	State Center,	Iowa.
Frey, S. B.,	Ames,	Iowa.
Felt, G. S.,	Des Moines,	Iowa.
Forman, L. W.,	West Branch,	Iowa.
Felter, V.,	Washta,	Iowa.
Forbes, C. M.,	Jefferson,	Iowa.
Fletcher, F. W.,	Worcester,	*Massachuset*
Fritzel, H. O.,	Conrad,	Iowa.
Golding, L.,	Glidden,	Iowa.
Glosener, Howard,	Reinbeck,	Iowa.
Geesaman, C. E.,	Middle River,	Iowa.
Galloway, J. W.,	Berlin,	Iowa.
Gray, J. E.,	Columbus Jun	Iowa.
Goodnow, O. E.,	Ames,	Iowa.
Gunder, F. E.,	Ames,	Iowa.
Grimm, A. L.,	Zearing,	Iowa.
Graves, F. J.,	Ames,	Iowa.
Grove, W. S.,	Ames,	Iowa.
Garner, E. R.,	Ida Grove,	Iowa.
Gillmore, F. A. E.,	Donahue,	Iowa.
Graves, Z. K.,	Ames,	Iowa.
Holland, W. B.,	Elwell,	Iowa.
Howard, E. R. T.,	Ames,	Iowa.
Hoyman, C. E.,	Stanwood,	Iowa.
Hawk, Roy,	Martinsburg,	Iowa.
Harris, N. J.,	Des Moines,	Iowa.
Hembd, John P.,	Ackley,	Iowa.

Hammer, C. G.,		
Holeton, Will,	Woodbine,	Iowa.
Heston, B. P.,	Libertyville,	Iowa.
Hay, I. J.,	Mingo,	Iowa.
Hunt, C. W.,	Logan,	Iowa.
Hubbard, D. R.,	Spencer,	Iowa.
Hanford, F. E.,	Mason City,	Iowa.
Hantz, A. P.,	Indianola,	Iowa.
Haddock, G. W.,	Marshalltown,	Iowa.
Holcomb, V. O.,	Boone,	Iowa.
Hauptman, Peary,	Hancock,	Iowa.
Hanson, Lewis O.,	Gilbert Station	Iowa.
Helmick, Jas. K.,	Columbus Junc	Iowa.
Hoffman, H. F.,	Washta,	Iowa.
Irving, G. B.,	Boone,	Iowa.
Johnston, N. M.,	Columbus Jun.	Iowa.
Johnson, F. J.,	Rolfe,	Iowa.
Kegley, J. W.,	Ames,	Iowa.
Kegley, S. M.,	Ames,	Iowa.
Kyhl, C.,	Fredsville,	Iowa
Kellogg, S. W.,	Miles,	Iowa.
Kellogg, C. J.,	Miles,	Iowa.
Kyle, T. J.,	Ames,	Iowa.
Kelly, W. S.,	Mondamin.	Iowa.
King, E. S.,	Grundy Center	Iowa.
Kelley, Samuel J.,	Ames.	Iowa.
Kegley, T. J.,	Ames	Iowa.
Lewis, F. G.,	Osceola,	Iowa.
Lynn, C. W.,	Shenandoah,	Iowa.
Lillibridge, E. A.,	Grundy Center	Iowa.
Lyons, E. G.,	Boone,	Iowa.
Long, Newton,	Luther,	Iowa.
Lord, Winford,	Rose Hill,	Iowa.
Leecing, J. W.,	Ames,	Iowa.
Littlefield, A. F.,	Exira,	Iowa.
Miles, H. J.,	Miles,	Iowa.
Miller, R. J.,	Ames,	Iowa.
Marolf, Fred,		
Maurice, W. S.,	Ottumwa,	Iowa.
Marshall, M. W.,	Ames,	Iowa.
Morris, James,	Linn Grove,	Iowa.
Meredith, P.,	Elburn,	*Illinois.*
Mead, I. J.,	Gilbert Station	Iowa.
Murphy, B.,		
Maulsby, W. P.,	Marshalltown,	Iowa.
Mamquist, H. A.,	Red Oak,	Iowa.
May, John C.,	Russell,	Iowa.
Mills, S. B.,	Ames,	Iowa.
Mauser, F. W.,	Storm Lake,	Iowa.

Misbach, J. D. F.,	Marengo,	Iowa.
Mitchell, J. C.,	Orillia,	Iowa.
McBirney, W. S.,	Conrad,	Iowa.
McCullough, W. A.,		
McCoy, Harry,	Indianola,	Iowa.
McIlrath, J. L.,	Hartwick,	Iowa.
McNiff, J. J.,	Rock Rapids,	Iowa.
McGrath, T. D.,	Ames,	Iowa.
McKibben, E. M.,	Albion,	Iowa.
McHenry, W. A.,	Denison,	Iowa.
McCoy, C. R.,	Indianola,	Iowa.
Novak, J. W.,	Williamsburg,	Iowa.
Nowlin, Ben.	Ames,	Iowa.
Oliver, J. P.,	Jefferson,	Iowa.
Orning, P.,	Gilbert Station	Iowa.
Ogle, J. W.,	Ames,	Iowa.
Opheim, G. J.,	Thor,	Iowa.
Paulson, John H.,	Britt,	Iowa.
Plumly, J. L.,	Springville,	Iowa.
Plumley, Geo. M.,	Springville,	Iowa.
Perry, F. W.,	Zearing,	Iowa.
Priem, Ed.,	St. Ansgar,	Iowa.
Peters, G. R.,	Stuart,	Iowa.
Pike, H. L.,	Whiting,	Iowa.
Peeso, L. B.,	Spencer,	Iowa.
Pascal, D. L.,	Grand Mound,	Iowa.
Phillips, Geo. B.,	Jefferson,	Iowa.
Popkes, B. W.,	Marshalltown,	Iowa.
Richeson, C. M.,	State Center,	Iowa.
Rickert, W. P.,	Reinbeck,	Iowa.
Russell, J. P.,	Lizard,	Iowa.
Rouzer, C.,	Boone,	Iowa.
Reidel, G. F.,	Albion,	Iowa.
Reynolds, Clifford,	Prophetstown,	*Illinois.*
Redhead, Geo. S.,	Des Moines,	Iowa.
Rogers, Ed. J.,	Halbur,	Iowa.
Rouzer, Ira,	Boone,	Iowa.
Rex, J. C.,	Ames,	Iowa.
Scott, C. R.,	Elwell,	Iowa.
Schenk, Myron,	Algona,	Iowa.
Shaum, B. F.,	Columbus City	Iowa.
Strohbehn, A.,	Reinbeck,	Iowa.
Simonds, Wm.,	West Branch,	Iowa.
Stevenson, Wm.,		
Steward, C. A.,	Ames,	Iowa.
Shinker, J. F.,	Pomeroy,	Iowa.
Skinner, C. L.,	St. Anthony,	Iowa.
Spooner, A.,	Mondamin,	Iowa.
Stickle, J. E.,	Macomb,	*Illinois.*

Sonneland, Fred,	Harlan,	Iowa.
Sarchett, Jake,	Indianola,	Iowa.
Samuelson, B. A.,	Odebolt,	Iowa.
Turner, A.,	Maxwell,	Iowa.
Turner, H. H.,	Maxwell,	Iowa.
Templeton, M. W.,	Gilbert,	Iowa.
Teander, E. N.,	Stratford,	Iowa.
Torres, G.,	Leon,	*Mexico.*
Talcott, Geo. M.,	Dow City,	Iowa.
Titus, E. A.,	Lytton,	Iowa.
Thompson, Jas H.,	Jefferson,	Iowa.
Turner, J. E.,	Adair,	Iowa.
Ulibarre, Ricardo,	Leon,	*Mexico.*
Van Zandt, F. H.,	Chicago,	*Illinois.*
Vincent, Homer W.,	Letts,	Iowa.
Vermilyea, Clyde,	Lacey,	Iowa.
White, Geo. C.,	Nevada,	Iowa.
Wright, Geo. G.,	Mt. Pleasant,	Iowa.
Woolley, Ben,	Highpoint,	Iowa.
Warden, H. E.,	Van Cleve,	Iowa.
Williams, T. L.,	Dawn,	*Missouri.*
Wickard, C. F.,	Maxwell,	Iowa.
Watts, Ralph E.,	Miles,	Iowa.
White, Fred,	Plymouth,	*Illinois.*
Ward, T. H.,	Storm Lake,	Iowa.
Wiese, G. H.,	Marengo,	Iowa.
White, G. H.,	Cherokee,	Iowa.
Winslow, W. J.,	St. Anthony,	Iowa.
White, J. T.,	Corydon,	Iowa.
Weber, Fred,	Woolstock,	Iowa.
Wilson, Geo. G.,	Viola,	*Kansas.*
Wyland, R. W.,	Harlan,	Iowa.
Whitney, C. G.,	Union,	Iowa.
Wylie, W. H.,	Boone,	Iowa.
Wall, J. C.,	Ankeny,	Iowa.
Whitcomb, Mark,	Gilmore City,	Iowa.
Williams, Syvert,	Humboldt,	Iowa.
Zimmerman, A. T.,	Washta,	Iowa.

LIST OF GRADUATES.

ALUMNI OF THE IOWA STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS.

GRADUATES OF 1872.

*J. C. Arthur, B. Sc., D. Sc., LaFayette, Indiana.
*P. S. Brown, B. Sc.
O. H. Cessna, B. Sc., B. D., D. D. Ames, Iowa.
*S. A. Churchill, B. Sc.
*S. H. Dickey, B. Sc.
Chas. N. Deitz, B. Sc., Omaha, Nebraska.
Luther Foster, B. Sc., M. S. A., Logan, Utah.
*H. Fuller, B. Sc.
*F. L. Harvey, B. Sc., M. Sc.
*E. M. Hungerford, B. Sc.
Mattie (Locke) Macomber, B. Sc., 3020 Kingman Ave., Des Moines, Iowa.
J. K. Macomber, B. Sc., 510 Youngerman Block, Des Moines, Iowa.
L. W. Noyes, B. Sc., 76 Rush St., Chicago, Ill.
H. L. Page, B. Sc., 810 17th St., Sioux City, Ia.
G. W. Ramsey, B. Sc., Masonville, Iowa.
*Fannie (Richards) Stanley, B. Sc.
*C. A. Smith, B. Sc.
*I. W. Smith, B. Sc.
H. C. Spencer, B. Sc., Grinnell, Iowa.
E. W. Stanton, B. Sc., M. Sc., Ames, Iowa.
J. L. Stevens, B. Sc., 728 Linn St., Boone, Iowa.
C. L. Suksdorf, B. Sc., 1335 Franklin St., Davenport,
*T. L. Thompson, B. Sc.
C. H. Tillotson, B. Sc., Ormund, Nebraska.
*C. P. Wellman, B. Sc.
J. M. Wells, B. Sc., Nevada, Iowa.

GRADUATES OF 1873.

E. L. Beard, B. Sc., Decorah, Iowa.
Rowena F. (Edson) Stevens, B. Sc., 728 Linn St., Boone, Ia.
*G. R. Flower, B. Sc.
W. Greene, B. Sc., Davenport, Iowa.
*G. W. Harvey, B. Sc.
A. M. Hawkins, B. Sc., 661 Yesler Way, Seattle, Washington
D. A. Kent, B. Sc., Jewell Junction, Iowa.
Kate (Krater) Starr, B. Sc., Algona, Iowa.
*J. S. Lee, B. Sc.

C. B. Maben, B. Sc., 403 Wash. Ave., Minneapolis, Minn.
M. F. Marshall, B. Sc., Atwood, Kansas.
Hattie E. (Raybourne) Morse, B. Sc., Littleton, Colorado.
W. O. Robinson, B. Sc., Trenton, Nebraska.
M. Stalker, B. Sc., V. S., M. Sc., Ames, Iowa.
Sallie (Stalker) Smith, B. Sc., Oskaloosa, Iowa.

GRADUATES OF 1874.

Estella (Bebout) Morse, B. Sc., 1302 6th Ave., Des Moines, Iowa.
C. D. Boardman, B. Sc., 1601 Arlington Ave., Des Moines, Ia.
C. S. Chase, B. Sc., Waterloo, Iowa.
C. E. Clingan, B. Sc., Sioux City, Iowa.
E. R. Clingan, B. Sc., Belt, Montana.
*C. P. Hastings, B. Sc.
J. G. W. Kiesel, B. Sc., 57 Highland Place, Dubuque, Iowa.
M. C. Litteer, B. Sc., Yukon, O. T.
O. P. McCray, B. Sc., 620 4th St., Sioux City, Ia.
G. E. Marsh, B. Sc., Osage, Iowa.
Mary A. (Palmer) Snell, B. Sc., Boone, Iowa.
A. A. Parsons, B. Sc., 326 Nevada Ave., Colorado Springs, Colorado.
Eva E. (Paull) Vanslyke, B. Sc., 1406-10 St., Des Moines, Ia.
E. A. Pyne, B. Sc., Blairstown, Iowa.
Ida E. (Smith) Noyes, B. Sc., 76 Rush St., Chicago, Illinois.
W. R. Smith, B. Sc., 1123 S. Central Park Ave., Chicago, Ill.
Kate (Tupper) Galpin, B. Sc., 515 S. Fremont Ave., Los Angeles, California.
J. R. Whitaker, B. Sc., Boone, Iowa.
*S. Y. Yates, B. Sc.

GRADUATES OF 1875.

E. P. Caldwell, B. Sc., Manila, P. I.
Millah (Cherrie) Whiting, B.Sc., Skaguay, Alaska.
Alice (Cunningham) Culver, B.Sc., Knoxville, Iowa.
Lizzie M. (Curtis) Foster, B.Sc., Logan, Utah.
R. P. Kelley, B. Sc., Eureka, Kansas.
C. H. Lee, B. Sc., 411 McPhee Block, Denver, Colorado.
W. R. Lamoreaux, B. Sc., Ft. Dodge, Iowa.
Hannah (Lyman) Caldwell, B.Sc., Helena. Montana.
F. J. Macomber, B. Sc., Lewis, Iowa.
Celestia (Neal) Gearhart, B. Sc., 359 7th St., Astoria, Ore.
T. L. Palmer, B. Sc., Lake Charles, Louisiana.
H. R. Patrick, B. Sc., Phoenix, Arizona.
C. E. Peterson, B Sc., Panora, Iowa.
*Ida (Ross) Boardman, B. Sc.
M. E. Rudolph, B. Sc., Canton, S. D.
Ida L. (Sherman) Caulkins, B.Sc., StormLake, Iowa.

L. C. Thornton, B. Sc., Pocahontas, Iowa.
J. M. Whitaker, B. Sc., Marshalltown, Iowa.
Nancy (Wills) Roundy, B. Sc., Hawarden, Iowa.
Lizzie M. (Wilson)) Edwards, B. Sc., Waterloo, Iowa.

GRADUATES OF 1876.

M. I. Aitkin, B. Sc., Lincoln, Nebraska.
A. P. Barker, B. Sc., Clinton, Iowa.
L. W. Beard, B. Sc., Decorah, Iowa.
A. M. Blodgett, B. Sc., 402 New England Building, Kansas City, Kansas.
Julia C. (Blodgett) Hainer, B. Sc., Aurora, Nebraska.
*L. A. Claussen, B. Sc.
J. E. Cobbey, B. Sc., 720 Grant St., Beatrice, Nebraska.
W. S. Collins, B. Sc., Basin, Wyoming.
Winifred (Dudley) Shaw, B. Sc., 1700 4th St., Des Moines, Ia
J. J. Fegtly, B. Sc., 943 S. Main St., Kingfisher, O. T.
W. J. Gilmore, B. Sc., Tipton, Iowa.
J. F. Hardin, B. Sc., Eldora, Iowa.
Ellen W. (Harlow) McKinzie, B. Sc., Palouse, Washington.
A. E. Hitchcock, B. Sc., Mitchell, S. D.
W. M. James, B. Sc., 309 Magoffin Ave., Catemaco, Vera Cruz, Mexico.
Ellie L. (Mead) Dissmore, B. Sc., Lakota, North Dakota.
G. A. Gerard, B Sc., Denver, Colorado.
H. N. Scott, B. Sc., 604 Portland Savings Bank, Portland, Oregon.
A. B. Shaw, B. Sc., 1700 4th St., Des Moines, Ia.
L. E. Spencer, B. Sc., 809-810 Equitable Building, Des Moines, Iowa.
W. W. Woodward, B. Sc., Lincoln, Nebraska.

GRADUATES OF 1877.

F. W. Booth, B. Sc., Mt. Airy St., Philadelphia, Penn.
Alfaretta (Campbell) Fassett, B. Sc., 1185 Scoville Ave., Oak Park, Illinois.
Mary C. (Carpenter) Hardin, B. Sc., Eldora, Iowa.
C. C. Colclo, B. Sc., Carroll, Iowa.
Kate S. (Curtis) Mirick,B. Sc., Monticello, Iowa.
J. W. Doxsee, B. Sc., Monticello, Iowa.
Mary (Farwell) Carpenter, B. Sc., Monticello, Iowa.
A. P. Hargrave, B. Sc., Dows, Iowa.
W. A. Helsell, B. Sc., Odebolt, Iowa.
J. B. Hungerford, B. Sc., Carroll, Iowa.
W. N. Hunt, B. Sc., Central City, Nebraska.
R. F. Jordan, B. Sc., Boone, Iowa.
*Cora B. (Keith) Pierce, B. Sc.
E. L. King, B. Sc., Osceola, Nebraska.
G. I. Miller, B. Sc., Boone, Iowa.

Alice (Neal) Gregg, B. Sc., Traer, Iowa.
J. C. Milnes, B. Sc., 2117 Olive St., Kansas City, Missouri.
Cora M. (Patty) Payne, B. Sc., Linden, Iowa.
L. B. Robinson, B. Sc., Harlan, Iowa.
T. L. Smith, B. Sc., 134 Tenth St., Milwaukee, Wisconsin.
F. L. Stratton, B. Sc., Osceola, So. Dakota.
*H. M. White, B. Sc.

GRADUATES OF 1878.

*Florence (Brown) Martin, B. Sc.
Richard Burke, B. Sc., Oskaloosa, Iowa.
H. L. Glenn, B. Sc., Helena, Montana.
A. E. Griffith, B S.c., M. Sc., Des Moines, Iowa.
J. C. Hainer, B. Sc., M. Sc., 309 Security Blg., St. Louis, Mo.
M. M. Hitchcock, B. C. E., 413 Pullman Bldg., Chicago, Ill.
C. E. Martin, B. C. E., San Antonio, Texas.
J. C. Meredith, B. M. E., Kansas City, Missouri.
Emma (McHenry) Glenn, B.Sc., 924 11thAve., Helena, Mon.
D. McKinnon, B. Sc., California Jc., Iowa.
J. N. Muncey, B. Sc., Jesup, Iowa.
C. F. Mount, B. C. E., C. E., West Plains, Missouri.
Ellen (Rice) Robbins, B. Sc., Manchester, N. H.
W. K. Robbins, B. Sc., M. Sc., 290 McGregor St., Manchester, N. H.
L. (Schepherd) Beckwith, B. Sc., Pattiway, California.
Ida (Twitchell) Blockman, B. Sc., Santa Maria, California.
E G. Tyler, B. C. E., Logan, Iowa.
T. F. Lee, B. Sc., Lakeport, California.
G. W. Wilson, B. C. E., Rockwell, Iowa.
J. W. Whitney, B. Sc., Prairieburg, Iowa.
Belle Woods, B. Sc., Pueblo, Colorado.

GRADUATES OF 1879.

Malinda (Cleaver) Faville, B. Sc., Norfolk, Virginia.
*S. Carrie (Carter) Hanson, B. Sc.
Lillie M. (Croy) Lee, B. Sc., 118 Oak Park, Chicago, Ill.
Geo. C. Faville, B. Sc., D. V. M., Norfolk, Virginia.
F. N. Field, B. C. E., Burlington, Iowa.
F. H. Friend, B. C. E., 598 Carroll St. ,St. Paul, Minnesota.
A. L. Hanson, B. C. E., Ada, Minnesota.
T. V. Hoggatt, B.Sc., Home Ins. Bldg., New York City, N. Y.
J. E. Hyde, B. Sc., Fargo, No. Dakota.
L. L. Manwaring, B. Sc., Stillwater, Minnesota.
W. G. McConnon, B. M. E. 317 W. Randolph St., Pittsburg, Pennsylvania.
Jennie (McElyea) Beyer, B. Sc., Ames, Iowa.
*J. C. Noble, B. Sc.
Herbert Osborn, B. Sc., M. Sc., 485 King Ave., Columbus, O.

J. D. Shearer, B. Sc., 517 1st Ave., Minneapolis, Minnesota.
Fremont Turner, B. M. E., Des Moines, Iowa.
W. M. Scott, B. Sc., Kiona, Wash.
J. M. Waugh, B. Sc., 500 Western Union Bldg., Chicago, Ill.
*Genevieve (Welch) Barstow, B. Sc.
W. Whited, B. M. E., M. E., 286 Main St., Pittsburg, Pa.
Alice (Whited) Burling, B. Sc., Eldora, Iowa.

GRADUATES OF 1880.

M. J. Bailey, B. Sc., Custer City, S. Dakota.
D. D. Briggs, B. Sc., Nevada, Iowa.
*F. Boddy, B. Sc.
O. S. Brown, B. Sc., Meservey, Iowa.
M. Hakes, B. Sc., Laurens, Iowa.
J. Hassett, B. Sc., Papillion, Nebraska.
*E. D. Harvey, B. Sc.
D. S. Hardin, B. Sc., Alma, Nebraska.
Carrie (Lane Chapman) Catt, B. Sc., Bensonhurst-by-the-Sea, New York, New York.
*C. H. McGrew, B. Sc.,
*R. M. Nicholson, B. Sc.
*G. E. Reed, B. Sc.
J. L. Simcoke, B. Sc., Adel, Iowa.
C. D. Taylor, B. Sc., Seattle, Wash.
W. A. Thomas, D. V. M., Lincoln, Nebraska.
J. Vincent, D. V. M., Shenandoah, Iowa.
W. B. Welch, B. Sc., D. V. M., Marshall, Missouri.

GRADUATES OF 1881.

Wm. C. Armstrong, B. C. E., Boone, Iowa.
Nellie M. (Bell) McGavern, B. Sc., Missouri Valley, Iowa.
A. M. Beresford, B. Sc., Orleans, Nebraska.
Thomas Burke, B. Sc., Des Moines, Iowa.
*Marilla J. Crossman, B. Sc.
Chas. M. Coe, B.Sc., Cor. 11 & Broadway, Kansas City, Mo.
F. E. Colby, B. C. E., Onawa, Iowa.
J. S. Dewell, B. Sc., Mo. Valley, Iowa.
C. A. Dodge, B. C. E., Orange City, Iowa.
E. C. Fortner, B. Sc., 801-106 State St., Chicago, Illinois.
F. E. Furry, B. Sc., Alden, Iowa.
M. J. Furry, B. Sc., Alden, Iowa.
Julia M. Hanford, B. Sc., 811 S. 11th St., Tacoma, Wash.
*R. J. Hopkins, B. Sc.
J. S. McGavern, B. Sc., Mo. Valley, Iowa.
W. H. McHenry, B. Sc., 919 18th St., Des Moines, Iowa.
W. O. McElroy, B. C. E., Newton, Iowa.
Fanny J. (Perett) Gault, B.Sc., 520 N.G.St., Tacoma, Wash.

Alice I. (Sayles) Osborn, B. Sc., 485 King Ave., Columbus, O.
T. W. Shearer, B. Sc., Wallisville, Texas.

GRADUATES OF 1882.

W. D. Atkinson, B. Sc., Parsons, Kansas.
*J. A. Blaine, B. Sc.
Etta M. Budd, B. Sc., Ames, Iowa.
Geo. W. Catt, B. C. E., Bensonhurst-by-the-Sea, New York, New York.
Mary (Coe) Lorbeer, B. Sc., Holt Ave., Pomona, Cal.
W. V. A. Dodds, B. Sc., Beatrice, Nebraska.
W. M. Dudley, B. Sc., Atlantic, Iowa.
*H. J. Gable, B. Sc.
C. I. Lorbeer, B. Sc., Holt Ave., Pomona, California.
J. B. Marsh, B. M. E., 1700 9th St., Des Moines, Iowa.
E. A. McDonald, B. Sc., City of Mexico, Mexico.
J. R. McKimm, B. Sc., Pittsburg, Kansas.
Nellie B. (Merrill) Wheeler, B. Sc., Des Moines, Iowa.
Della A. Neal, B. Sc., LakeCharles, Louisiana.
J. H. Patten, B. Sc., Denver, Colorado.
Hattie A. Perrett, B. Sc., Rock Falls, Iowa.
Lizzie Perrett, B. Sc., Rock Falls, Iowa.
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*Kitty E. Reeve, B. Sc.
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Sarah (Smith) McDonald, B. Sc., City of Mexico, Mexico.
D. T. Stockman, B. Sc., Sigourney, Iowa.
W. S. Summers, B. Sc., Omaha, Nebraska.
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W. U. White, B. Sc., Hope, S. Dakota.

GRADUATES OF 1883.

A. M. Allen, B. Sc., 2116 Kenwood Parkway, Minneapolis, Minnesota.
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G M. Burnham, B. Sc., Ashland, Wisconsin.
Bertie N. (Carson) Cleave, B. Sc., Marseilles, Illinois.
George Caven, B. C. E., South Water St., Chicago, Illinois.
Jennie L. Christman, B. Sc., Albany, New York.
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Geo. W. Curtis, B.S.A., M.S.A., Dallas, Texas.
C. M. Doxsee, B. Sc., Algona, Iowa.
*Lottie Estes, B. Sc.
C. H. Flynn, D. V. M., Postville, Iowa.
*Jessie E. (Frater) Muncey, B. Sc.
R. M. Hunter, B. Sc., Sibley, Iowa.
Chas. H. Kegley, B. S. A., Olympia, Wash.

Minnie (Knapp) Mayo, B. Sc., LakeCharles, La.
Herman Knapp, B. S. A., Ames, Iowa.
Mary W.(McDonald)Knapp,B.Sc., Ames, Iowa.
Kate (McNeil) Wells, B. Sc. Lincoln, Nebraska.
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*Effie G. Slater, B. Sc.
F. J. Smith, B. Sc. Alton, Iowa.
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Agatha M. (West) Ramsey, B. Sc., Rock Rapids, Iowa.
Mabel A. (Young) Alexander, B. Sc., Clarion, Iowa.

GRADUATES OF 1884.

J. F. Armstrong, B. Sc., Faulkton, S. Dakota.
Edna (Bell) Anderson, B. Sc., Missouri Valley, Iowa.
T. F. Bevington, B. Sc., Iowa Bldg., Sioux City, Iowa.
Geo. R. Chatburn, B. C. E., University of Neb., Lincoln, Neb.
C. J. Clark, B. C. E., Denver, Colorado.
J. E. Daugherty, B. C. E., Texarkana, Texas.
*W. P. Dickey, B. Sc.
L. M. Garrett, B. Sc., 703 W. 7th St., Des Moines, Iowa.
J. W. Gill, B. C. E.
B. T. Hainer, B. Sc., Perry, O. T.
H. H. (Hainer) Gabel, B. Sc., Aurora, Nebraska.
*A. E. (Henry) Quint, B. Sc.
G. E. Hibbs, B. Sc., Mitchellville, Iowa.
A. S. Hitchcock, B. S. A., M. Sc., Washington, D. C.
F. A. Huntley, B. S. A., Moscow, Idaho.
F. L. Lambert, B. S. A., CharlesCity, Iowa.
W. E. D. Morrison, D. V. M., LosAngeles, Cal.
E. J. Nichols, B. C. E., Tyler, Texas.
G. M. Osborn, D. V. M., Lebanon, Missouri.
F. L. Pitman, B. C. E., Port Norfolk, Virginia.
J. F. Porter, B. C. E., Alton, Illinois.
Addie (Rice) Hainer, B. Sc., St. Louis, Missouri.
C. H. Sloan, B. Sc., Geneva, Nebraska.
G. W. Thompson, B. C. E., Casey, Iowa.
C. Vincent, B. Sc., Omaha, Nebraska.
M. Vincent, B. S. A., Huston, Texas.
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*W. J. Wicks, B. Sc.
W. H. Wier, B. Sc., Webster City, Iowa.
Alfred Williams, B. C. E., Skaguay, Alaska.
Fannie R. Wilson, B. Sc., 501 Poplar St., Atlantic, Iowa.
G. W. Wormley, B. C. E., Newton, Iowa.

GRADUATES OF 1885.

C. L. Bowie, B. M. E., 105 S. 10th St., Tacoma, Washington.
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C. A. Cary, B. Sc., D. V. M., Auburn, Alabama.
D. B. Collier, B. S. A., Durant, Iowa.
D. E. Collins, D. V. M., Beatrice, Nebraska.
G. F. Goodno, B. Sc., M. Sc., Waukegan, Illinois.
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W. M. Hays, B. S. A., M. S. A., St. Anthony Park, Minn.
*E. N. Hill, B. M. E.,
D. L. Hutchinson, B. C. E., Goldfield, Colorado.
Hannah (Hutton) Shearer, B.Sc., Wallisville, Texas.
L. D. Jackson, B. M. E.,
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G. W. Knorr, B. S. A., Clark'sStation, Kentucky.
*C. J. Lee, B. Sc.,
Frank Leverett, B. Sc., Denmark, Iowa.
J. C. Lipes, B. Sc., Aurora, Missouri.
J. C. B. Lockwood, B. C. E., Seattle, Wash.
*Anna G. (McConnon) Bevington, B. Sc.,
L. F. McCoy, B. C. E., Dumont, Iowa.
A. G. Mosier, B. C. E., Dawson City, N. W. T.
Anna L. (Nichols) Goodno, B. Sc., Waukegan, Illinois.
W. B. Niles, D. V. M., Omaha, Nebraska.
*Oak G. Norton, B. S. A.
J. G. Pope, B. M. E., Cuyahoga Falls, Ohio.
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E. E. Sayers, D. V. M., Algona, Iowa.
F. S. Schoenleber, B. S. A., M. S. A., Morris, Illinois.
I. B. Schreckengast, B. Sc., West Liberty, Iowa.
Lydia A. (Schreckengast) Collier, B. Sc., Durant, Iowa.
S. Stewart, D. V. M., Kansas City, Kansas.
C. E. Underhill, B. Sc., Onawa, Iowa.

GRADUATES OF 1886.

J. W. Bradford, B. C. E., Nashua, Iowa.
B. Buchli, B. Sc., D. V. M., Alma, Kansas.
P. S. Burns, B. Sc., Boston, Mass.
H. L. Chatterton, D. V. M., Peterson, Iowa.
S. D. Clough, B. Sc., Pine Bluffs, Arkansas.
M. Z. Farwell, B. Sc., LaJunta, Colorado.
*V. C. Gambell, B. Sc.
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G. W. Green, B. S. A., 244 & 226 Ex. Bldg., S. Omaha, Neb.
S. H. Hedges, B. C. E., Troop & 105th St., Chicago, Illinois.

W. B. Hunter, B. Sc., (TimesHerald) Chicago, Ill.
A. P. Johnson, B. C. E., Sigourney, Iowa.
G. A. Johnson, D. V. M., Sioux City, Iowa.
E. S. Johnson, D. V. M., Morning Sun, Iowa.
Lizzie Langfitt, B. Sc., Greenfield, Iowa.
H. J. Langfitt, B. Sc., Hutchinson, Minnesota.
W. R. Myers, B. Sc., Garvanza, Cal.
E. P. Niles, D. V. M., Blacksburg, Virginia.
M. H. Reynolds, B. S. A., D. V. M., St. Anthony Park, Minn.
O. W. Rich, B. S. A., Atlantic, Iowa.
E. S. Richman, B. S. A., M. S. A., Fullerton, California.
H S. Stewart, B. C. E., D. V. M., Kansas City, Kansas.
J J. Streets, D. V. M, Los Angeles, Cal.
Cora (Wagner) Hunter, B. Sc., Des Moines, Iowa.

GRADUATES OF 1887.

G. Z. Barnes, D. V. M., Pekin, Illinois.
S. A. Beach, B. S. A., M. Sc., Geneva, New York.
*R. C. Bennett, D. V. M.
E. Besser, D. V. M., 419 Market St., Logansport, Indiana.
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Emma I. (Casey) Scofield, B. L., Azusa, California.
E J. Christie, B. Sc., Cedar Rapids, Iowa.
*S. B. Clark, B. Sc.
G. H. Colton, B. S. A., Seattle, Wash.
*C. J. Coley, B. Sc.
Esther Crawford, B. L., Dayton, Iowa.
C. F. Curtiss, B. S. A., M. S. A., Ames, Iowa.
A. C. Felt, B. Sc., Superior, Nebraska.
C. W. Furguson, D. V. M., Chappell, Nebraska.
*W. H. Frater, B. C. E.
G. S. Govier, B. C. E., Argentine, Kansas.
F. H. Graves, D. V. M., Madrid, Iowa.
Norma (Hainer) Beach, B. Sc., Geneva, New York.
L. V. Harpel, B. Sc., Perry, Iowa.
N E. Hansen, B. Sc., M. Sc., Brookings, S. Dakota.
F. W. Hoskins, D. V. M., Sioux Rapids, Iowa.
W. S. Igo, D. V. M., Palmyra, Iowa.
E. A. Kirkpatrick, B. Sc., M. Ph., Fitchburg, Massachusetts.
F. W. Mally, B. Sc., M. Sc., College Station, Texas.
O. E. McCarthy, B. C. E.
A. E. Osborn, B. Sc., LaPorte City, Iowa.
L. G. Patty, D. V. M., Carroll, Iowa.
Joseph Paxton, B. C. E., Aspen, Colorado.
J. A. Perley, B. C. E., Monticello, Iowa.
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R. P. Thurtle, D. V. M., Ashawa, Iowa.
John Tillie, D. V. M., Muscatine, Iowa.
Ollie (Wilson) Curtiss, B. L., Ames, Iowa.
J. W. Wilson, D. V. M., Traer, Iowa.

GRADUATES OF 1888.

John G. Abraham, B. Sc., Mt. Pleasant, Iowa.
F. W. Ainsworth, D. V. M., Ashawa, Iowa.
J. B. Allen, B. Sc., Cczad, Nebraska.
Clarence Baker, B. C. E., 1022 25th St., Des Moines, Iowa.
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Scott, Bradford, B. Sc., Storm Lake, Iowa.
A. Brandvig, B. Sc., Ottumwa, Iowa.
G. L. Buffington, D. V. M., Baxter, Iowa.
J. G. Davidson, B. M. E., 119th St., Whiting, Indiana.
F. L. Dobbin, B. Sc., Oklahoma, O. T.
*C. A. Finnigan, B. C. E.
Grant Flora, B. C. E., Montour, Iowa.
W. N. Gladson, B. M. E., Fayetteville, Arkansas.
K. H. Granger, B. Sc., S. Weymouth, Mass.
James E. Gyde, B. Sc., Wardner, Idaho.
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G. L. Meisner, B. Sc., Liberty, Nebraska.
Laura R. Moulton, B. L., Grinnell, Iowa.
E. K. Paine, D. V. M., Bondurant, Iowa.
R. C. Sayers, D. V. M., Fairfield, Iowa.
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B. J. Sheldon, B. Sc., Ames, Iowa.
E. B. Skinner, B. Sc., Calliope, Iowa.
N. Spencer, B. Sc., Algona, Iowa.
C. E. Tallman, B. Sc., Scotts Station, Alabama.
W. L. Thompson, B. Sc., Bayard, Iowa.
L. C. Tilden, B. Sc., Ames, Iowa.
W. E. Warwick, B. M. E., Whiting, Indiana.
Nannie E. Waugh, B. L., Manchester, Iowa.
Florence (Weatherby) Hainer, B. L., Perry, Oklahoma Ter.
Julia A. (Wentch) Stanton, B. L., Ames, Iowa.
W. H. Wright, B. Sc.,
Sherman Yates, B. Sc., Tipton, Iowa.

GRADUATES OF 1889.

C. A. Ashworth, D. V. M., Valley Junction, Iowa.
James A. Baker, B. Sc., Ames, Iowa.
J. E. Banks, B. C. E., Singapore, India.
S. W. Beyer, B. Sc., Ph. D., Ames, Iowa.
D. B. Bisbee, B. Sc., 9042 Houston Ave., Chicago, Illinois.
*A. E. D. Bosquet, D. V. M.
W. B. Budrow, B. Sc., La Gran Fundicion, Monterey, Mex.
*H. W. Chamberlain, B. Sc.
*F. H. Cooley, B. C. E.
Harry B. Day, B. M. E., Seymour, Iowa.
J. E. Durkee ,B. Sc., Sioux Rapids, Iowa.
H. A. Gossard, B. Sc., Lake City, Florida.
A. L. Graham, B. M. E., Sarnia, Ontario.
B. T. Green, B. Sc., Hawarden, Iowa.
W. R. Hensen, B. Sc., Chinook, Montana.
Nellie Johnson, B. L., Edmond, O. T.
James A. Kelsey, B. Sc., M. Sc., New Brunswick, N. J.
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Albert McClelland, B. Sc., Ivy, Iowa.
A. A. McLaughlin, B Sc., 217 Youngerman Block, Des Moines, Iowa.
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S. W. Morris, B. Sc., Corning, Iowa.
S. B. Nelson, D. V. M., Pullman, Wash.
Belle Newell, B. L., Woodward, Iowa.
Ira A. Nichols, B. Sc., Iowa Falls, Iowa.
John H. Platt, D. V. M., Montezuma, Iowa.
W. U. Rickard, B. C. E., Texarkana, Arkansas.
P. H. Rolfs, B. Sc., M. Sc., Clemson College, S C.
*John Schoenleber, B. M. E.
W. U. Scott, B. Sc., Slater, Iowa.
J. O. Simcoke, D. V. M., Stuart, Iowa.
John A. Shelton, B. Sc., Butte, Montana.
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Palmer W. Starr, B. C. E,. Carson, Iowa.
C. H. Stearns, B. Sc., Des Moines, Iowa.
John S. Stroud, B. Sc., Des Moines, Iowa.
M. W. Thornburg, B. Sc., Redfield, Iowa.
Rosalia Thurliman, B. L., Carroll, Iowa.
C. M. Wade, B. Sc., Sioux City, Iowa.
Mary C. (Zimbleman) Otis, B. L., Boone, Iowa.

GRADUATES OF 1890.

Nettie Bannister, B. L., Cherokee, Iowa.
Jay A. Bishop, B. Sc., New Hampton, Iowa.
Wm. E. Bolles, B. C. E.,
John A. Bramhall, B. M. E., 2562 Spaulding St., Omaha, Neb.
Meyer Brandvig, B. Sc., M. Ph., Gilbert Station, Iowa.
Joseph S. Chamberlain, B. Sc., Baltimore, Maryland.
Herbert E. Crosby, B. Sc., Alta, Iowa.
Chas. D. Davidson, B. M. E., Whiting, Indiana.
W. C. Dewell, B. Sc., Magnolia, Iowa.
Edward N. Eaton, B. Sc., Chicago, Illinois.
Mary E. (Fellows) Weare, B. L., Chicago, Illinois.
C. Quintus Fuller, D. V. M., Milford, Iowa.
*Belle (Gaston) James.
T. Alexander Geddes, D. V. M., Washington, D. C.
J. Melville Graham, B. Sc., Audubon, Iowa.
*May Hardy, B. L.
Spencer Haven, B. Sc., Hudson, Wisconsin.
Eugene Henley, B. Sc., Brooklyn, Iowa.
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James McLaughlin, D. V. M., BlueEarthCity, Minnesota,
Ada (Mills) Dewell, B. L., Magnolia, Iowa.
James C. Norton, D. V. M., Phoenix, Arizona.
Robt. W. Olmsted, B. Sc., Rock Island, Illinois.
Violet U. Quint, B. L., Manhattan, Kansas.
Maria M. Roberts, B. L., Ames, Iowa.
Geo. H. Schulte, B. Sc., Elkader, Iowa.
Wm. H. Shaul, B. Sc., Des Moines, Iowa.
Kate (Stevens) Harpel, B.L., Perry, Iowa.
John T. Stinson, B. Sc., Mountain Grove, Missouri.
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GRADUATES OF 1891.

Geo. S. Angus, B. C. E., 25 N. Artesian Ave., Chicago, Ill.
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Chas. A. Ballreich, B. Sc., Des Moines, Iowa.
Sara T. Barrows, B. L., Columbus, Ohio.
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*Clinton C. Clarke, B. Sc.
May (Cottrell) Woods, B. L., Woodward, Iowa.
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Wm. H. Heileman, B. Sc., M. Sc., Pullman, Washington.
Rollin E. Hinds, B. C. E., Ottumwa, Iowa.
R. Frederick Hodson, B. Sc., Ames, Iowa.
E. P. Hudson, B. Sc., Britt, Iowa.
Thomas B. Hutton, B. Sc., Ida Grove, Iowa.
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Chas. W. Johnson, B. Sc., Des Moines, Iowa.
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John F. Schulte, B. Sc., Victor, Iowa.
Benj. F. Shaum, B. C. E., ColumbusCity, Iowa.
J. H. Shepperd, B. Ag., M. S. A., Fargo, North Dakota.
F. A. Sirrine, B. Sc., M. Sc., Jamaica, Long Island.
Nels Sorenson, D. V. M., Louisville, Kentucky.
John E. Spaan, B. Sc., Indianapolis, Indiana.
Grant F. Starkey, D. V. M., Jordan, Iowa.
Walter D. Steele, B. M. E., New York City, New York.
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Dennis A. Thornburg, B. Sc., Grinnell, Iowa.
Samuel Whitbeck, D. V. M., Decorah, Iowa.
Peter M. Wilson, D. V. M., Traer, Iowa.

GRADUATES OF 1892.

Chas. B. Adams, D. V. M., 2396-116th St., Chicago, Illinois.
Geo. M. Ashford, B. C. E., Cape Nome, Alaska.
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Geo. W. Brown, B. C. E., Boone, Iowa.
Inez J. Christie, B. L., E. St. Louis, Illinois.
E. E. Clinton, B. C. E., 493 W. Monroe St., Chicago, Illinois.
W. Ross Cooper, D. V. M., Newton, Iowa.
Edgar C. Corry, B. Sc., Des Moines, Iowa.
Genevieve Culver, B. L., Audubon, Iowa.

Homer Davis, D. V. M., B. Sc. M. Sc., 2617 Franklin St., Omaha, Nebraska.
Anna (Dean) Blair, B. L., E. Des Moines, Iowa.
Chas. C. Deering, B. Sc., Boone, Iowa.
C. U. Emry, B. C. E., Fairfield, Iowa.
Geo. S. Foster, B. C. E., Ames, Iowa.
Kittie B. Freed, B. L., Arapahoe, Nebraska.
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Eugene B. Henry, B. Sc., Klamath Falls, Oregon.
William C. Hicks, B. Sc., 310 Chicago Ave., Chicago, Ill.
Edwin D. Jones, B. C. E., Hamburg, Arkansas.
Elmer E. Kaufman, B. Ag,. Fargo, N. Dakota.
S. Arthur Knapp, B. Sc., Lake Charles, La.
E. A. Littell, B. C. E., Kansas City, Missouri.
C. W. Mally, B. Sc., M. Sc., Cape Town, South Africa.
Jessie (Maxwell) Freeland, B. L. Ames, Iowa.
Frank L. Meredith, B. Sc., Ames, Iowa.
Clarice (McCarthy) McNaughton, B. L., Eagle Grove, Iowa.
Wilton McCarthy, D. V. M., Des Moines, Iowa.
E. S. McCord, D. V. M., Delmar Jc., Iowa.
W. P. Milburn, B. M. E., Eby, California.
Gordon P. Miller, B. Sc., Des Moines, Iowa.
C. R. Molison, D. V. M., Greettinger, Iowa.
Jennie (Morrison) Beyer, B. Sc., Ames, Iowa.
Fred R. Muhs, B. C. E., St. Louis, Missouri.
Fred S. Phelps, B. Sc., 113 W. Harrison St., Chicago, Ill.
Kate M. Porter, B. L., Woodbine, Iowa.
Henry Replogle, D.V.M., 385 S. Hermitage Ave., Chicago, Ill.
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John A. Rolfs, B. Sc., Eldridge, Iowa.
T. T. Rutledge, B. Ag., P. I.
Robt. Sloan, B. Sc., Geneva, Nebraska.
Louis B. Spinney, B.M.E.,M. Sc., Ames, Iowa.
Fred C. Stewart, B. Sc., M. Sc., Geneva, New York.
Arthur C. Stokes, B. Sc., Omaha, Nebraska.
*C. E. Swenson, B. Sc.
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H. C. Wallace, B. Agr., Des Moines, Iowa.
G. S. Waterhouse, D. V. M., Farley, Iowa.
Hugh H. West, D. V. M., Spurling Bldg., Elgin, Illinois.
Elmina T. Wilson, B. C. E., C. E., Ames, Iowa.
Flora H. Wilson, B. L., Washington, D. C.
Vincent Zmunt, B. Sc., Iowa City, Iowa.

GRADUATES OF 1893.

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Bert Benjamin, B. M. E., 1182 Lawndale Ave., Chicago, Ill.
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Vinnie (Williams) Grattan, B. L., Medford, O. T.

GRADUATES OF 1894.

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Ida M. (Clark) Campbell, B. L., Clear Lake, Iowa.
Louis B. Craig, B. M. E., Newport News, Virginia.
Ella B. Curtis, B. L., Independence, Iowa.
Fannie E. (Curtiss) Craig, B. L., Newport News, Virginia.
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E. C. Dickinson, B. M. E., Chicago, Iowa.
S. R. Fitz, B. Sc., Steamboat Rock, Iowa.
Annie W. Flemming, B. Sc., Ames, Iowa.
Anna Georgen, B. L., Worthington, Iowa.
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Charles Lincoln, B. M. E., Homingan Luzon, Philippine I.
Scott W. Linn., B. M. E., Cleveland, Ohio.
E. M. S. McLaughlin, B. M. E., Des Moines, Iowa.
Alex. McKinnon, B. M. E., Windsor, Conn.

W. L. Meinzer, B. Sc., Howard, S. Dakota.
John Meissner, B. Sc., Leighton, Iowa.
J. C. Miller, B. C. E., Galesburg, N. Dakota.
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A. H. Seaver, B. C. E., Nashville, Iowa.
Harry Shanks, D. V. M., Millersburg, Iowa.
Maha (Silliman) Munns, B. L., Corning, Iowa.
Emma T. Sirrine, B. Sc., Dysart, Iowa.
H. J. Stevens, D. V. M.,
A. W. Stuntz, B. E. E., Owensburg, Kentucky.
Clarence Van Epps, B. Sc., Clinton, Iowa.
Arthur R. Wake, D. V. M., Kansas City, Missouri.
Carter B. Weaver, B. Sc., Ames, Iowa.
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Ellsworth Wilson, D. V. M., Jewell, Iowa.
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GRADUATES OF 1895.

Arthur J. Ashby, B. E. E., Britt, Iowa.
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Elmer D. Ball, B. Sc., Ft. Collins, Colorado.
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Charles Cave, B. E. E., Waverly, Iowa.
J. W. Crawford, B. Sc., Newton, Iowa.
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J. G. Danielson, B. Ag., Harcourt, Iowa.
J. R. Davison, B. Sc., Louisville, Kentucky.
E. T. Davison, D. V. M.
Ruth (Duncan) Tilden, B. L., Ames, Iowa.
C. R. Duroe, B. M. E., Sioux Rapids, Iowa.

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A. H. Foster, B. M. E., NewBedford, Mass.
Jerome B. Frisbee, B. Ag, Sheldon, Iowa.
Burt German, B. M. E., Fremont, Ohio.
Clarence Goddard, B. C. E.
W. E. Gossard, B. Sc., Ames, Iowa.
G. D. Gunn, B. Sc., Sumner, Nebraska.
Geo. W. Hardin, B. Sc., Castle, Montana.
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Ira B. Johnson, B. Sc., Marne, Iowa.
Raymond Johnson, D. V. M., Richland, Iowa.
Fred J. Lazell, B. Sc., Cedar Rapids, Iowa.
C. C. Lewis, B. M. E., Burlington, Iowa.
H. T. Lewis, B. M. E., Nira, Iowa.
John W. Lewis, B. C. E., "On Forty-Mile Creek," Alaska.
L. L. Lewis, D. V. M., Stillwater, O. T.
G. W. Louthan, B. Ag., Linn Grove, Iowa.
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GRADUATES OF 1898.

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Sarah C. Hook, B. L., Ames, Iowa.
Monroe R. Hull, B. Sc., B. M. E., Chicago, Illinois.
Ewing M. Johnson, B. Sc., Ontario, Iowa.
Irene Jones, B. Sc., Manchester, Iowa.
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John C. Kyle, B. E. E., Ames, Iowa.
Fred R. Lowery, B. Sc., B. M. E., Chicago, Illinois.
Kate La Rue, B. L., Van Horn, Iowa.
Fred N. Lewis, B. C. E., Milwaukee, Wisconsin.
Edward E. Little, B. Ag., Ames, Iowa.
John B. Love, B. Ag., Byron, Illinois.
C. J. McCusker, B. Sc., Decorah, Iowa.
Willis McKay, B. Sc., Omaha, Nebraska.
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Eugene D. Perry, B. Sc., Ft. Dodge, Iowa.
Marius J. Pos, B. M. E., Cleveland, Iowa.
Ellson G. Preston, B. Ag., Des Moines, Iowa.
Elizabeth (Read) Cohn, B. L., Ames, Iowa.
Alice E. Reed, B. L., Monticello, Iowa.
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GRADUATES OF 1899.

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Howard L. Eckles, B. Sc., Marshalltown, Iowa.
Fannie Ora Edgett, B. Sc., Ames, Iowa.
George L. Ehlers, B. Sc., Plymouth, Iowa.
Henry O. Fritzel, B. Sc., Conrad, Iowa.
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Racine D. Goble, B. Sc., Ames, Iowa.
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Clarence J. Griffith, B. S. A., Fort Collins, Colorado.
Walter I. Griffith, B. S. A., Millersburg, Iowa.
Roland O. Hayter, B. M. E., Manley, Iowa.
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Arthur G. Hopkins, B. S. A., Madison, Wisconsin.
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H. Harold Hume, B. S. A., Lake City, Florida.
Edward W. Humphrey, D. V. M., Spinson, Iowa.
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W. J. Kennedy, B. S. A., Champaign, Illinois.
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